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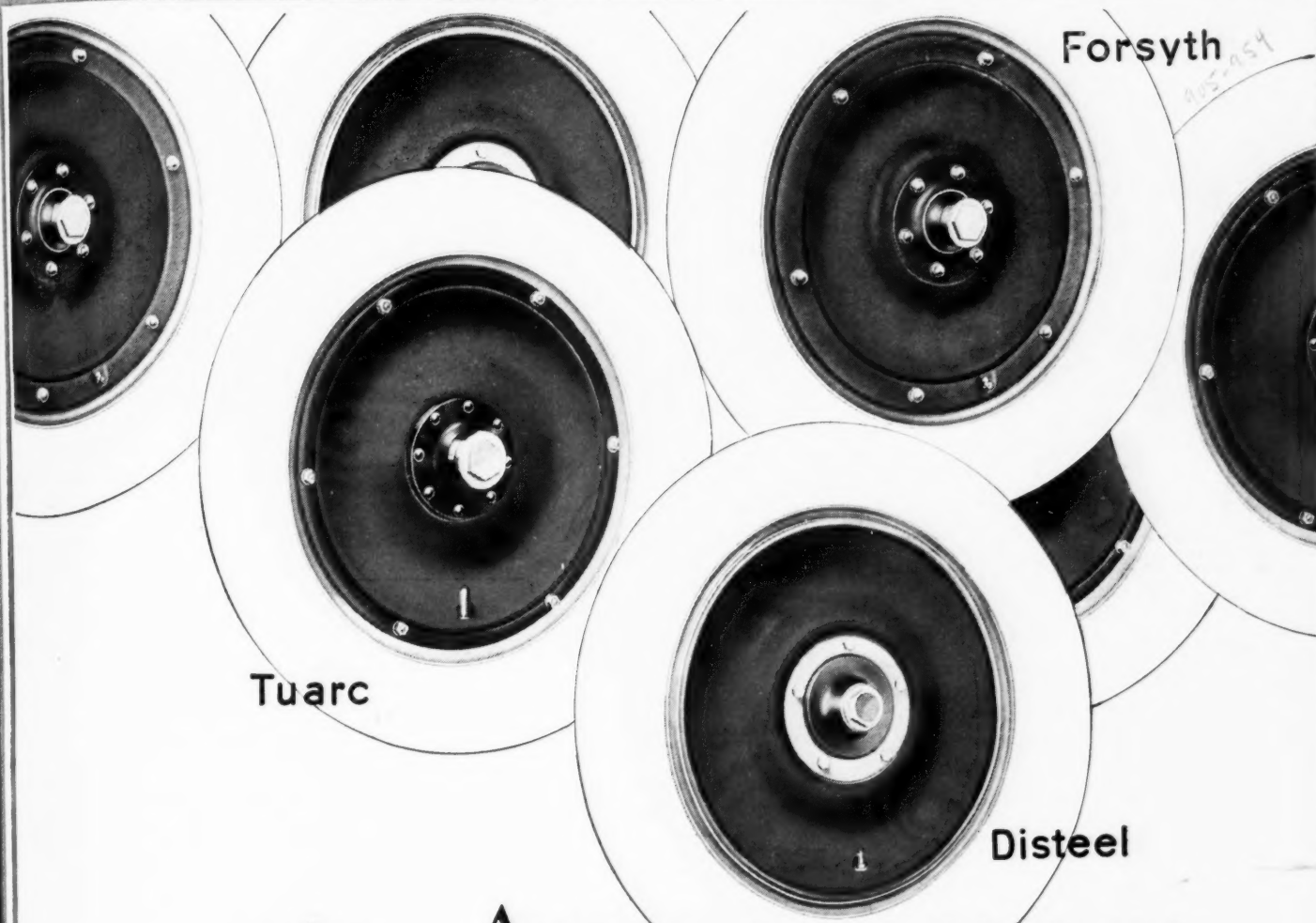
AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Vol. XLVIII
Number 17

PUBLISHED WEEKLY AT 239 WEST 39th STREET
NEW YORK, APRIL 26, 1923

Thirty-five cents a copy
Three dollars a year



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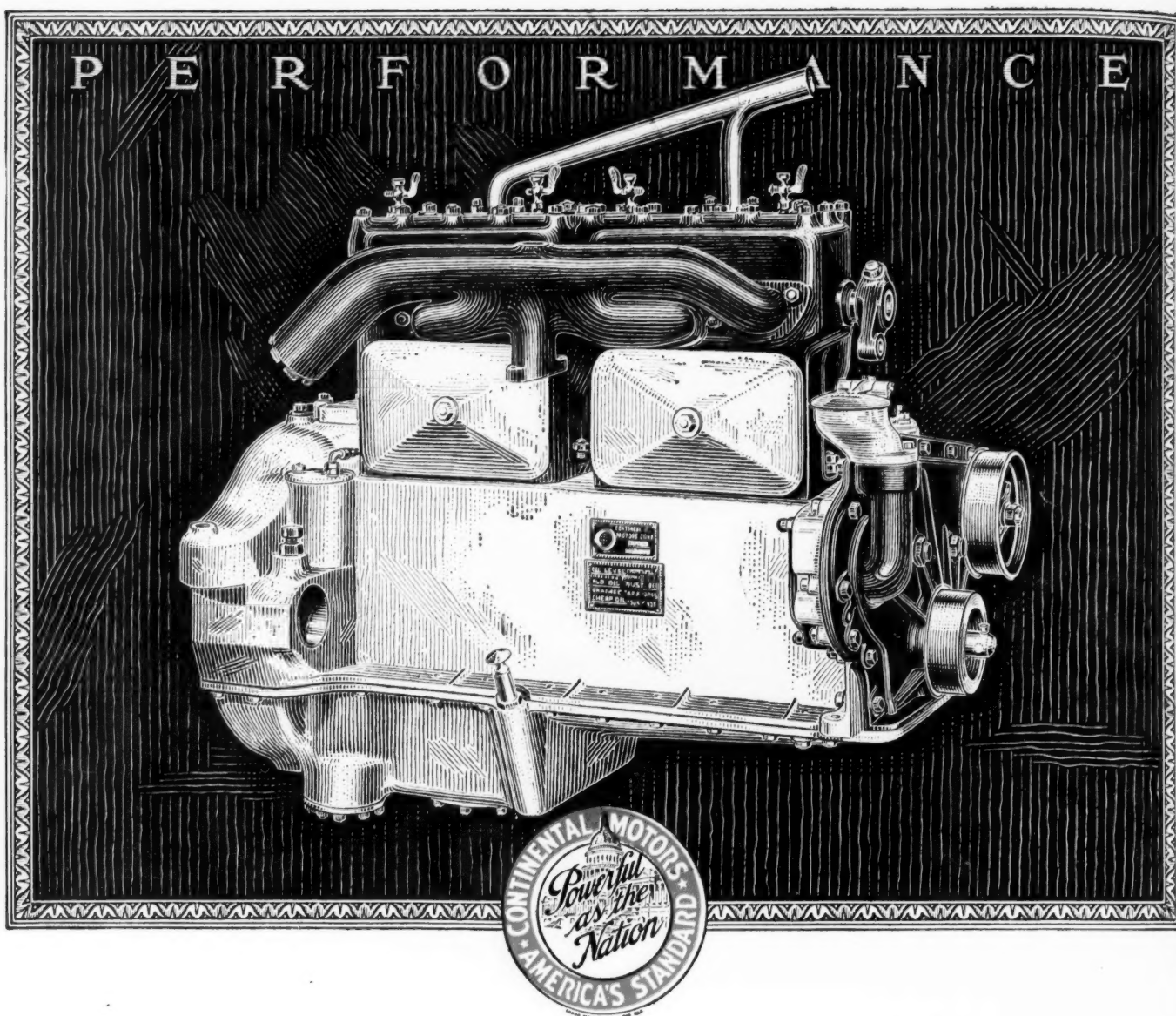
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Exports May Take Up Sales Slack If Home Demand Declines

Foreign consumption promises to provide historic 10 per cent required to assure prosperity. Shipments for 1923 to other countries probably will set new mark for all kinds of automotive products. World hungry for individual transportation.

By James Dalton

YEARS of usage have made an economic axiom of the statement that any industry which can find an export market for 10 per cent of its products is assured of prosperity provided domestic demand can be maintained at a reasonable level.

A beneficent Providence seems to be guarding the automotive industry for it has reached this happy situation at a time when there soon may be a slackening in domestic consumption. Happy those companies which have not neglected foreign dealers and buyers because they could sell at home more motor vehicles than they could make. The time has come when they will reap their harvest.

The statement recently has been made in some quarters that American industry can sustain itself at the peak of production without material assistance from abroad and that this country now is so self contained that it need not concern itself about foreign markets.

America would be lucky indeed if such were the case, but we don't believe it can be permanently. One factor which cannot be overlooked in any consideration of the enormous current demand for all varieties of products is that the standard of living in this country is higher than in any other and that our people are the greatest buyers on the globe.

Industry in the United States was disrupted for more than half a decade by war conditions, both before and after we began hostilities. As a result

there was a huge backed up demand for all kinds of products. When the full slack of this demand has been taken up there will be a perfectly natural decline in the volume of domestic demand and economic laws will reassert themselves.

Another factor which should not be overlooked in any consideration of foreign markets is that the measure of potential demand never has been taken. Sales up to this time never have been comparable to what they will be ultimately, for all the world is hungry for individual transportation. Makers in other lands may some day be able to compete on a price basis but it is highly improbable.

IT is quite conceivable that the day will come when the annual foreign demand for American cars, trucks and equipment will approach in volume the domestic consumption. The world is gradually recovering from the wounds of war and unless there is another cataclysmic catastrophe normal conditions eventually will be restored, even in stricken Europe.

Even today other countries are taking a keen interest in the construction of improved roads. Naturally, they lack the funds for building highways on anything like the scale familiar in the United States, but they realize the importance of improving their road systems. Lack of usable highways has been the chief deterrent to the widespread use of motor ve-

hicles in many lands and there will be an active market as road building continues to progress.

It isn't necessary to sell the rest of the world on the value of cars and trucks. They recognize it now and they will buy in enormous quantities as soon as funds and highways are available. It requires no long stretch of the imagination, therefore, to visualize the ultimate possibilities of the export field.

Even today foreign shipments are impressive. On the basis of shipments in January and February, which are the only months for which complete figures are available, the year will show an export demand for 257,000 vehicles. This will not fall far short of 10 per cent of the total production. The figures for these two months include shipments from the United States and Canada and Ford foreign production.

Monthly Exports Make Big Gain

THE total for the 60-day period was 42,991 cars and trucks, or a monthly average of 21,495. The monthly average last year was about 15,000. Consideration also must be given to the fact that January and February are not the months of major export demand. They were the smallest of the year in 1922 and it is logical to assume they will be this year.

While accurate figures for March are not obtainable, exports from the United States and Canada are going forward at a rate two or three times as large as for the same period in 1922. It will be surprising, therefore, if the total for 1923 does not approximate 300,000 as compared with about 185,000 in 1922. The figures available speak for themselves:

	U. S. Shipments		Canadian Shipments	
	Jan.	Feb.	Jan.	Feb.
1922	2871	3550	1442	2983
1923	7396	10,449	5035	6106

To these should be added Ford's foreign assembly of 8368 for January and 7573 for February. Comparative figures for the same month in 1922 are lacking.

These statistics tell an eloquent story of the market for motor vehicles abroad. It is surprising that such a limited number of manufacturers are making an earnest, persistent and intelligent effort to build up their export business. Only about a dozen passenger car makers have gone after sales aggressively and they are making them.

It is even more surprising that most producers of parts, accessories and garage equipment have evinced an interest less than half-hearted in foreign markets which are literally crying for the goods they produce. Development of this field has lagged behind vehicle sales. Demand is large today and it will increase steadily, insuring a permanent outlet for goods. The replacement market for equipment is becoming more substantial each year.

Neglect of Field Bad Business

SALESROOMS, garages and service stations comparable to those in the United States are springing up in almost every quarter of the globe. The owners are having difficulty in getting the stocks they need, although they would gladly make satisfactory financial arrangements. Neglect of this field may be regretted keenly when the home market slows up as it will sooner or later, although a huge permanent replacement business promises to stabilize this branch of the industry earlier than some others.

Interesting instances of export sales success could be multiplied indefinitely. Ford's foreign sales early this year were larger than ever before for a single month.

The same was true of General Motors Export Corp. during March. One company which handles accessories on a large scale in foreign fields broke its sales records in January and again in February. March exceeded the total for the two months. The truck market is relatively light, but one comparatively small company sold more commercial vehicles abroad last year than it did in the New York metropolitan district. An accessory company which went into the foreign field in 1922 sold 7 per cent of its production in that market.

Fundamentally, the strong export market is based on improving business and financial conditions in other countries of the world. With few exceptions they now offer definite markets for the American manufacturer of all classes of automotive products. The exceptions are Central Europe, the Balkans, Russia and some parts of the Far East, although some improvement is to be found even in these nations.

The prosperity which the United States has been enjoying for the last year is just beginning to make itself felt in the rest of the world. Trade and finance developments follow by half a year what takes place here.

It is a question of world economics. If America is prosperous it draws upon the other markets of the world for the raw materials they produce—wool from Argentina and Australia, mutton from New Zealand, tin from the East Indies and Bolivia, rubber from the East Indies, sugar from Cuba, Porto Rico and the Philippines, linseed from Argentina, nitrates and copper from Chile and Peru, manufactured products from England, watches and laces from Switzerland, and so on throughout the world.

Trade Cycle Similar in Foreign Lands

THIS is what is happening today with a resultant increase in foreign orders. The automotive industry is going through exactly the same cycle elsewhere that it did at home, except that it is a half year later. The slump hit the United States in 1920, but did not reach most other countries until early the following year. Domestic prosperity began coming back early in 1922, but it did not spread to other countries until later that year and early this year. The automotive industry was one of the first to return to normal here and it is the same in other lands because there is a tremendous need for individual transportation.

Only a year ago the motor bus was practically unknown in Peru. Today there are something like 100 of them, mostly Fords, in operation in Lima, the capital, and numerous lines are being established for cross-country and rural service in other parts of the country. A few bus lines were opened in Buenos Aires eight or ten months ago. Now buses form a vital part of the city's transportation system. Their use is expanding the demand for all kinds of motor trucks.

When Ford enlarged his assembly plant in Buenos Aires to a capacity of 25,000 vehicles a year it was designed to take care of expected sales for a long time to come, but it already is operating at capacity and has been for three months without being able to fill all the orders.

Foreign business forecasters predicted that Argentina would take about 10,000 vehicles in 1922 and they thought they were rather optimistic at that. At the end of the year it was found sales had reached about 17,500 or 75 per cent more than expected. Conservative estimates place 1923 sales at 25,000.

Australia is breaking all records for cars, trucks and accessories, and so is New Zealand. Cuba, with sugar bringing about three times the cost of production, is getting ready for big business and several far-sighted auto-

The Motor Car in Foreign Lands

American cars awaiting drive-away and shipment to interior cities of Argentina. This picture was taken at Buenos Aires in February, 1923



A fine dealer establishment in Madrid, Spain



Automobiles in Havana, Cuba. A street scene during the recent carnival



Laborers constructing a road in interior Peru



A section of the recently completed Central Highway, 175 kilometers in length, across the Dominican Republic

motive executives have gone to the island in the last few weeks to look into the possibilities.

Estimates on the increased use of the automobile in Spanish-speaking countries in the last four years show a jump of 300 per cent for Spain; 250 per cent for Argentina and Mexico and from 200 to 250 per cent for Cuba. Other territories, in addition to the Spanish countries, tell about the same story.

The automotive merchandising situation is similar to that which prevails in the United States. It is a fight for representation. The cream of the business is going to those companies which have the best representation. A few years ago automobile sales were made only in a comparatively small number of foreign cities. Now they are everywhere. Ford has nearly 300 dealers in Argentina alone. Sales and service stations have sprung up in the smallest hamlets. Few companies have gone beyond the big city stage, however, and some of the things

that have been done in the name of distribution would make a mummy weep.

The American automobile is still without serious competition from European makers except in their own countries. Sales resistance is relatively strong in England, France, Italy and Germany, but such is not the case in Spain, Belgium, Scandinavia, the Far East, Latin-America and elsewhere. The American automobile is at the top of the heap and it is practically the only one sold in most of these countries.

When Americans go into foreign markets their fight for business is not against foreign competitors but against those they meet at home.

The world market for American automotive products is "getting better and better every day in every way" and those manufacturers who are overlooking this fact will find, when leaner months come, that they have lost a mighty fine anchor to windward.

Automotive Business to Have Banner Year in South Africa

THE year 1923 promises to be a banner year for the automotive business in South Africa, according to reports to the Department of Commerce from Trade Commissioner P. J. Stevenson, Johannesburg; Consul G. K. Donald, Johannesburg, and Vice Consul A. H. Cawston, Cape Town. In spite of the general depression during 1922 there was a steady increase in demand for motor vehicles of all kinds. Stocks of cars held in bond, which have so hampered the import trade since 1920, have practically disappeared, the 270 cars still located at the principal centers at the end of 1922 representing current stocks which will be cleared and replaced as new models come in.

While the total number of cars imported during 1922 was more than double the number in 1921, the value was only about one-third greater. American cars, manufactured in the United States and Canada, comprise over 90 per cent of all cars brought into South Africa, and this shift in ratio of values to numbers reflects chiefly the results of lowered prices on the American output as compared with prices in 1921.

The most gratifying feature about the comparatively heavy shipments received in the last quarter of the year is that they were sold shortly after arrival. The unusually large number imported during November and December—546 and 538, respectively—in each case more than quadrupled the 137 received in February.

Low Priced Touring Cars Best Sellers

The best selling car in South Africa is an American designed, Canadian manufactured, lightweight make selling for £200 to £350. Next to this, the best sellers are lightweight American cars selling for £350 and £500. American manufacturers will find difficulty in disposing of cars in South Africa which sell for more than \$1,200 in the United States. There are more five-passenger touring models sold than of any other types. A fair number of two-passenger roadsters are sold, and one Cape Town dealer has lately found the four-passenger sport model very popular.

Although closed cars have had little demand heretofore, a number of American makes were imported recently and sold practically on sight, their lowered prices, together with favorable ocean freight rates, making it possible to quote them at an attractive figure. In spite of the warm weather which prevails during most of the year, the wind and dust and the heavy rainfall in many

sections make a closed car desirable and the demand for that type is likely to grow.

A flourishing motor-bus business has been started in Johannesburg since December, 1921, and has become a competitor of the municipal electric car system, besides making trips to towns within a distance of 100 miles. Most of the buses in use have a capacity of 18 to 20 passengers and all are on American chassis.

A large company has been organized recently through the initiative of an American manufacturer's representative, with sufficient capital and backing for an extensive system of buses. The service will be started between Johannesburg and Pretoria and gradually extend to all towns of the Rand, later reaching to the Cape Province and Natal. The one bus completed by this company thus far consists of an American chassis with a locally built body. It accommodates 25 passengers and has a maximum speed of 40 m.p.h.

Trolley Lines to Use Buses

The Johannesburg municipality is said to be considering the purchase of six motor buses to supplement its existing trolley lines.

The Government-owned South African railways have also initiated freight and passenger bus lines as feeders to the railroad, thus developing traffic with isolated country districts. On some of these lines the farmer can book his freight through via motor or railroad.

South Africa, for the next year and a half or two years, cannot be looked upon as a promising field for the sale of accessories, as it will probably require that much time to absorb the stocks left over from 1920. The effect of throwing these stocks on the market at very low prices is seen in the decreased importations of parts and accessories, running from a value of £702,240 in 1920 to £213,878 in 1921 and to £208,744 in 1922 (the last amount includes chassis which, on the basis of the preceding two years' ratio, should not exceed 15 per cent of the year's total value as here given).

There is virtually no market for luxurious fittings, expensive novelties, etc. Only the necessities are salable. On account of freight costs, import duty and larger profits required by dealers to cover the greater expense of larger stocks and salesman's travel, motor accessories have to be retailed for at least double the American retail prices; consequently, only the less expensive grades of such goods are in demand.

Sales Stability Not Yet Reached, Says Alex Legge

International Harvester Co. president advocates conservative expansion programs. Depression improbable as lessons of 1920 are not forgotten. "Farm Power Equipment Day" at state fairs planned by implement makers. Enthusiasm at tractor meeting.

PRESENT business conditions are based upon a superficial foundation and some recession of activity is to be expected in the near future according to Alex Legge, president of the International Harvester Co. Legge's address was the chief event of the meeting of the Tractor and Thresher Department of the National Association of Farm Equipment Manufacturers held in Chicago on April 20. A decision to institute a "Farm Power Equipment Day" at most of the state fairs next summer and discussion of a general purpose tractor constituted other major features of the gathering.

Legge gave some highly interesting opinions on what present industrial activity means to farm machine manufacturers. He did not confine himself to the effect on the implement makers, however, but discussed the meaning of the present industrial activity in a very general way. A considerable part of his talk was in answer to questions from the farm implement manufacturers in his audience.

He began by calling attention to the fact that the present prices of pig iron and steel are at practically the same level as during the post-war boom. He said that pig iron is quoted at \$32 a ton and recalled prices during the war fixed at \$33. In analyzing the causes of the present high prices of raw materials, he said that too much of the blame has been placed after superficial thinking. In his mind the automobile, which is usually mentioned, is not much to blame. Although the manufacturing program for automobiles is very high this year, it is not a great percentage higher than last year. Also, Legge does not regard the automobile industry as an alarming competitor in metals consumption.

Railroads Buying Steel Supplies

He dismissed the building industry in a good deal the same terms. The real offenders, he said, are the railroads, and he called attention to the fact that the railroads are now in the market heavier than ever before in their history. He said that the railroads always buy on a high market, and that when the railroads are buying metals, it is time for other buyers, especially those who sell in a competitive market, to stay out. He said the railroad men explain this situation to him by saying they can dispose of their bonds only in times of prosperity. Consequently they always buy after a market has been found for their securities.

As to the duration of the present industrial activity, Legge refused to express a personal opinion. He finds that opinions vary as to the exact date when there will be a let-up; but that every person with whom he has talked agrees that there must be a let-up in the com-

paratively near future. Some of these persons have given their idea of dates. These ranged from the latter part of July until next March. So far as he is concerned, he is willing to leave the question of date entirely open with the assurance that there is to be a let-up.

As to the direct effect of this high-priced raw material era on the farm implement manufacturers, he said that so far as the International Harvester Co. is concerned, it simply cannot repeat the experience of 1920. He intimated that his company is not going into the market as a competitor with excessively high-priced materials and labor to manufacture implements supposed to be for sale in 1924.

Farmers Cannot Afford Present Prices

It is his belief that the farmer cannot afford to buy implements manufactured on present prices of materials and labor. He called attention to the fact that while raw material prices are now at the level fixed by the government during the war, and while labor is nearing war-time prices, the farmer instead of getting the Hoover fixed price of \$2.40 for wheat is getting only \$1.25 in the open market. He recalled how the farmer had protested the \$2.40 price, saying that it was not of comparative value to the goods he must buy. Consequently the farmer, if he could not buy implements on \$2.40 wheat, cannot buy them on \$1.25 wheat.

Legge emphasized a danger in reading the market prospects today. He warned all manufacturers present to investigate very thoroughly all reports of prospects. This, he said, is necessary to sift out the duplicates and avoid the great mistake of 1920 when manufacturers were running ahead full blast, making high-priced products on prospect reports that were sometimes pyramided ten-fold. Collapse under these conditions was inevitable, and will be repeated unless caution is used.

The best hope that the speaker held out under the present conditions is that the great American people have not forgotten in three years the lesson of 1920.

Questions about the building situation came in for considerable discussion. Several of those present had recently noted that, while the building permits were heavier than ever before, some of the larger enterprises were being cancelled. Two very large buildings, contemplated and planned during the winter, were quoted as having been indefinitely postponed. Legge said that he could understand this situation because the small builders are able to pass along the increased cost of the production at once, but the large scale building has to be spread over a number of years.

Several of Legge's audience asked what the outcome

is to be. Legge expressed the general opinion that there will be a series of periods of increased industrial activity and of relaxation. These cycles will continue with each spurt of activity failing quite to reach the height of the previous spurt. And each period of relaxation failing to reach the depression for the previous period.

Quite a number of times there was mention of the immigration laws. None of those present predicted any great relaxation in present restrictions, but Legge expressed the hope that there would be a better administration of the regulations. He said at present it is much easier for a Polish or a Russian Hebrew to enter this country than it is for one of the farmer or labor class. He believes that this situation is due very largely to the influence of labor leaders on the administration of the law; that they are quite willing to permit the ranks of the merchant class to be greatly augmented, but are entirely unwilling to have the ranks of laborers greatly increased. He said that this wrong situation would remedy itself.

Legge was not without hopeful thoughts. He said that his greatest hope at present is based on the fact that only a few days ago a sale of pig iron was made at a 50-cent concession. He had also learned of a sale of steel in the Pittsburgh market at a concession. These are merely straws, he thinks, and will be followed by others. He believes that there is prospect of a gradual recession of present markets, because this country is now producing pig iron and other metals more heavily than ever before. He thinks that despite present industrial activity, due somewhat to the restricted labor market and perhaps the disinclination of conservative manufacturers to bid too freely for labor, normal stocks of reserve metals will be broken up, and that a period of more reasonable sales will come as a result. The present situation is more or less of a natural reaction against the almost entire depletion of stocks during and following the depressed period of 1921 and 1922.

"Farm Power Equipment Day"

"Farm Power Equipment Day" will be a feature at most of the state fairs held this year, if satisfactory arrangements can be made with the various state fair

boards. The Tractor and Thresher Department of the N. A. F. E. M. authorized Guy H. Hall, manager of the National Institute of Progressive Farming, to enter into negotiations with the state fair secretaries to ascertain what rates would be charged for space for exhibits and what space would be available. In case these are satisfactory, members will be permitted to make exhibits and demonstrations at the fairs. This action by the department was brought about by the success which attended "Ford" days at the fairs last year. Ford does not belong to the association and last year he went it alone. At every fair where a Ford day was advertised the attendance broke all records.

General Purpose Tractor Discussed

Great interest was taken in what C. M. Eason had to say about the production of a general purpose tractor. Without giving any intimation of what form or type of tractor the future general purpose tractor would be, Eason expressed himself as convinced that progress toward the development of such a machine was being made and that it would appear in the near future. He said that tractor manufacturers during the past have been moving along lines which are more theoretical than practical; that they have based their designs upon the assumption that the most economical power unit for the farm was a tractor of 3 or 4 plow capacity. He said this was all wrong. Investigation of actual farm working conditions would have convinced them that the real farm power unit is two horses. This makes necessary the design of a tractor of about the same capacity, but which shall be so designed that it will do the general 2-horse work on the farm. Eason told the tractor manufacturers that when they entered the market with such a machine the demand for it would instantly be greater than manufacturing facilities could supply.

The meeting of the Tractor Section of the S. A. E. and the meeting of the Tractor and Thresher Department were the best attended and the most enthusiastic gatherings of tractor men held since the slump overtook the tractor industry more than two years ago. It is evident that the tractor industry is coming back and that interest in its future development is far from dead.

Summer Months Best Period for Sales in Latvia

MAY, June, July and August appear to be the best months for automobile sales in Latvia, according to a report to the Department of Commerce, though the difference in the small demand for cars from one season of the year to another is not marked. The poorest months appear to be January and February, when there is little or no navigation.

The use of automotive vehicles in Latvia, compared with other European countries is still very limited. Registrations in Riga, the largest city in Latvia as of Jan. 1, 1923, were: 135 passenger cars, 68 trucks, 95 motorcycles; and Riga is to all intents and purposes the only city in the country with automotive traffic. Exclusive of government-owned machines, the total number of automobiles in the country is less than 200, or about one car to every 10,000 inhabitants.

About 75 touring cars are owned by private individuals, a large proportion of which are used cars purchased from various institutions. A large percentage of the cars imported in 1922 were of German make, which were sold easily on account of the depreciation of the mark. In some instances cars shipped in transit to Russia did not go beyond Latvia and were sold there.

There is at present in Riga one agency for a popular low-priced American car, and the agency for another middle-priced American car has recently been assigned.

Improvement should first be noted the vice consul states in the market for trucks and later, in that for moderate-priced passenger cars.

Most of the trucks now in Latvia are owned by the Government and by official and semi-official organizations, such as the Latvian Red Cross, etc. A small number are owned by forwarding companies, garage owners and firms. Trucks are used all the year round. The closing of navigation from Jan. 15 to April 1 inclusive may be regarded as the dull season for operation of trucks.

There are approximately 30 tractors in Latvia, of which about 12 were imported by the Government and sold to agricultural organizations. As the large farms are split up into small farms not exceeding 50 hectares, the only practicable way for the ordinary farmer to use tractors is through membership in an organization which will buy the machines and lend them in turn to the members. It is reported that the Government has allowed about \$20,000 for the purchase of motor plows by local agricultural organizations.

Truck Fleet Operators Tell Engineers How to Reduce Service Costs

Need of further standardization and simplification of models shown at S. A. E. Metropolitan Section meeting. Knowledge of owner's problems essential to improving design. Universal cost system urged. Factories should furnish engineering data.

MUCH remains to be done in the direction of standardization and simplification of motor trucks to enable the fleet operator to simplify his maintenance problem, according to Edward E. La Schum, general superintendent of motor vehicle equipment, American Railway Express Co., New York.

At a meeting of the Metropolitan Section of the Society of Automotive Engineers last Thursday, La Schum told of the difficulties which his company had experienced with "manufactured" and "assembled" vehicles and offered many suggestions to automotive engineers.

The movement toward further standardization is very desirable, said La Schum, were it not for the fact that carrying it too far would deprive trucks of their individuality. He believes that many small changes made in truck design are unnecessary and cause considerable confusion coming through in all too frequent intervals. La Schum said in part:

It is a lamentable fact, but a fact nevertheless, that on July 1, 1918, when all the express companies were merged into one company, the new company found itself in control of 59 different makes of motor vehicles and in these 59 different makes there were 131 different models.

There were a considerable number of old-line, or so-called manufactured trucks, and you would think that if we had purchased one make we would have had a standardized maintenance proposition but when I tell you that out of 377 trucks manufactured by an old-line company we had 21 different models in which the parts were only in a small degree interchangeable, you can see how far from standardization we were kept by the engineers.

We have recently bought trucks from an old-line company and after receiving the first lot changes were made without notice to us before we received the second lot, even though the second lot was purchased within a few months after the first, making it necessary for us to carry two radiators in our stock room where one should have been enough.

Lack of Standardization Adds to Cost

We have received trucks from an old-line company in one particular case and in a fleet of eight trucks, all delivered at the same time, there were three different makes of magnetos.

This great difference in models and in constructional units complicates and makes difficult our maintenance problem, and adds much to its cost.

In selecting equipment our engineering knowledge teaches us that a so-called "manufactured truck" or so-

called "assembled truck" in which the important constructional units are properly designed and properly assembled will be found to be identical, and with either one maintenance should be performed economically and satisfactory performance of the truck assured.

The selection of motor vehicle equipment in the beginning certainly has much to do with the maintenance problem and here again engineering knowledge is necessary in order to keep away from the complicated apparatus that has been offered by old-line companies in particular, and by some concerns who offer complicated apparatus which is vastly different from standard or common practice.

Much Left for Engineers to Do

We know that much has been accomplished by engineers in the way of simplification and standardization and we would like to see them continue toward standardization, were it not for the fact that carrying standardization too far in motor vehicles would deprive them of individuality. While to my mind building motor vehicles has reached the stage of common practice, still the engineers, I realize, must engineer some individuality into the jobs.

I have asked engineers to develop a mileage counter but there seems to be great indifference on the part of truck engineers who have let the old hubodometers stand. This instrument probably would record regularly and accurately were it not for the fact that it is placed in the most hazardous position possible.

The great difficulty with it is that it will not stand the abuse of collision with curbstones, elevated pillars, and other hubs. It is impossible, therefore, for the truck owner to keep records based on actual miles traveled because there is no hubodometer made that will stay on the job.

I have asked engineers to provide a standardized radiator guard or at least complete a job when they turn it out by applying a radiator guard. They, in many cases, leave this up to the owner.

I have repeatedly tried to find out just why it is necessary to remove the seat cushion in a motor truck, almost without exception, to fill the gasoline tank. Why can't we have a filler pipe extended out through the seat panel so that the tank may be filled without disturbing a lot of seat cushions and cab curtains?

I have told the Secretary of this Section that it would be difficult for me to write a paper which would be anything but complimentary to the engineers designing motor trucks. I believe it would be sheer folly and extremely expensive for the truck owner to use engineers for re-designing or re-engineering because the records

of reliability of the machines of today are really excellent.

I believe that the following figures will be highly interesting to those who have not gone into them in detail. Not considering drivers' wages, depreciation, interest and insurance, our operating costs are distributed as follows:

Gasoline	\$30.00
Cylinder oil.....	2.25
Tire costs.....	2.50
Painting	1.30
Body repairs.....	4.75
Chassis repairs.....	35.20
Garage expenses.....	24.00

\$100.00

For the year 1922 I have taken the following cities—Atlanta, Buffalo, Chicago, Cleveland, Detroit, New York, San Francisco and Washington, D. C., and in these cities you have the snow belt, you have cities which have little snow, and you have cities which have no snow and no cold weather.

In these cities there are 802 gasoline trucks, very few of them less than 2-tons capacity, the greatest number being of 2 and 3½ tons capacity, and a considerable number being of 5-ton capacity. Generally, there are 300 working days per year but from these 802 trucks we have accomplished 306,348 working days of eight hours. The total mileage, as near as we know, was 9,190,440 miles.

During the same year in the same cities we had 722 electric trucks, from which we obtained 226,716 working days. On these trucks we were called out less than two times per truck per year, or for a total of 4,987,752 miles.

During the year we had approximately 91 electric motors burned out, that is, either the field or armature burned out which was 4.8 per cent of the trouble, but that is small compared to the 4,987,752 miles. In many cases it was due directly to the fact that the trucks had to encounter deep snow, mud, ice, cold, rain, heat and in all probability considerable overloading. We had 366 cases of batteries exhausted, which caused 19.1 per cent of the trouble, but it also means that a battery was ex-

hausted once per truck per two years.

The other item of importance were controllers which caused 12.1 per cent; steering gear, 6.2 per cent; axles, 1.5 per cent; brakes, 5 per cent; springs, 1.3 per cent; drive chains, 11.6 per cent; and here let me say that on the modern electric truck, drive chain troubles were eliminated.

During that year we received 6254 calls for help from the gasoline trucks. I mean by that that there was something the matter with the truck, and the driver called the garage for assistance. This was a little less than seven times per truck per year.

Following is an analysis of the causes of these calls, given in percentages of the total (6254) number:

Motor bearings.....	0.8
Spark-plugs	5.9
Ignition system.....	9.1
Carbureter	8.6
Gasoline lines clogged or leaked.....	7.6
Broken fans or fan belts.....	9.3
Radiators	1.1
Water pump or line.....	1.6
Radiators or pumps, frozen.....	0.2
Governors	0.5
Steering gears.....	3.3
Clutch	3.0
Propeller shaft.....	1.5
Universal joints.....	1.1
Transmissions	3.0
Differentials	0.5
Rear axles.....	0.9
Radius rods.....	0.9
Drive chains.....	3.8
Wheels	1.5
Springs	1.8
Brakes	2.2
Tires	3.3
Lights	1.0
Accidents, only.....	1.6
Out of gasoline or oil.....	3.1
Miscellaneous	23.8

Total..... 100.0

The balance, 23.8 per cent, was for minor troubles, such as inability of the driver to start the motor, the truck in the ditch, or in the mud or snow.

DISTRIBUTION OF CHASSIS OVERHAUL COSTS

Item	Labor Hours.		Labor Cost.		Material Cost.		Overhaul Cost.	
	Total	Per Cent	Total	Per Cent	Total	Per Cent	Total	Per Cent
Disassembling	67.42	9.27	50.57	7.21	.84	.12	51.41	3.65
Motor	153.42	21.09	156.84	2.38	397.85	56.16	554.69	39.33
Carbureter	8.17	1.12	8.39	1.21	.60	.08	8.99	.64
Magneto	4.00	.55	4.17	.59	2.43	.34	6.60	.47
Radiator, muffler....	15.25	2.10	12.00	1.71	.56	.08	12.56	.89
Clutch	7.17	.99	7.30	1.04	14.44	2.04	21.74	1.54
Transmission	36.08	4.96	37.53	5.35	51.68	7.28	89.21	6.33
Differential	19.75	2.72	20.28	2.89	46.22	6.51	66.50	4.72
Jackshaft	3.50	.48	3.52	.50	.....	.....	3.52	.25
Frame	62.58	8.60	62.44	8.91	1.11	.16	63.55	4.51
Fr. and Rr. const....	24.83	3.41	25.42	3.63	44.27	6.25	69.69	4.94
Steering	41.50	5.71	43.07	6.14	1.78	.25	44.85	3.18
Brakes	34.83	4.79	36.13	5.15	28.83	4.07	64.96	4.61
Radius and tie rods...	7.83	1.08	8.14	1.16	5.95	.84	14.09	1.00
Springs	18.95	2.61	19.23	2.74	15.17	2.14	34.40	2.44
Wheels .....	.....	.....	.....	.....	5.63	.79	5.63	.40
General assembly....	216.50	29.76	200.48	28.59	.95	.13	201.43	14.29
Miscellaneous	5.50	.76	5.58	.80	90.50	12.76	96.08	6.81
Grand total.....	727.32	100.00	701.09	100.00	708.81	100.00	1,408.90	100.00

The business spotlight is being turned on the motor truck and such organization as there is back of it. The light should be focused first, on the organization of maintenance; second, on the organization of operation. Each organization should be required to analyze costs, and to study legislation referring to truck operations. Each organization should be required to analyze costs in order that nothing may be left undone which will bring about greater efficiency and satisfaction to the owner.

LA SCHUM'S paper precipitated much interesting discussion and many good suggestions were offered by men who are engaged in the maintenance end of truck fleet operation. J. F. Winchester of the Standard Oil Co. urged that engineers develop a standardized form of cost sheet which would permit fleet operators to keep operating cost records in such a way as to enable them to make comparison possible. At the present time no two operators use the same form. The form, he said, would have to be simple to keep bookkeeping costs low.

Winchester suggested that factory engineers draw up mechanical installation sheets to assist the operator to handle such things as cylinder boring, etc., also, that they give complete and detailed engineering data.

Engineers, Winchester said, can render great assistance by paying more attention to wiring layouts, generator mountings and generators which will satisfactorily

charge the battery. Simplification along these lines will help the truck maintenance problem materially.

F. C. Horner of the General Motor Corp. agreed heartily with Winchester that there was great need for a standardized cost system. He believes that engineers should have a more thorough knowledge of the problems of operation in order to carry on their engineering work with more efficiency. Vehicles, he said, must be simplified. The motor truck needs to have its frills removed and that is a problem for the engineer which may be brought about through cooperation with truck operators.

David Beecroft presented some interesting figures on the number of fleet operators maintaining their own service stations. These operators want further simplification in truck design as is indicated by the fact that out of 5000 replies to a questionnaire 50 per cent made this demand.

Beecroft urged the members of the society to turn their attentions to the problem of maintenance as being worthy of their best efforts. Cooperation between engineers and operators will help to further the best interests of the truck industry.

The new officers of the Metropolitan Section were announced as follows: C. T. Myers, chairman; W. E. Kemp, vice-chairman; F. H. Dutcher, secretary; C. B. Veal, treasurer, and for the board of directors: A. D. T. Libby, E. E. La Schum and J. W. Lord.

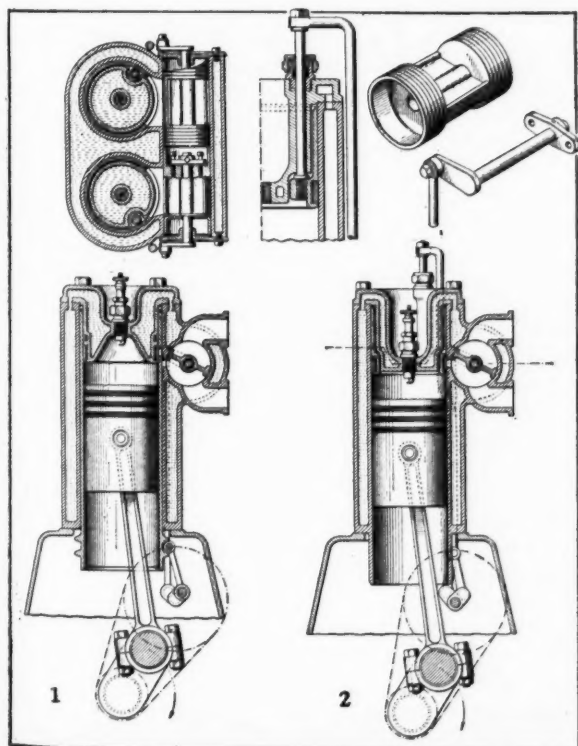
New Engine Combines Single Sleeve and Oscillating Valves

AN engine which combines a single sleeve valve with a single oscillating valve has recently been patented by James Keister. In this engine, sectional views of which are here reproduced, the sleeve can be arranged to surround the piston and be sealed by a junk ring, in a

manner similar to that employed in Knight engines, or can be placed overhead out of contact with the piston as shown diagrammatically in Fig. 2. In either case the valve is provided with a single set of ports, which register with ports in the wall of the cylinder, and is given a reciprocating motion from a half-time shaft.

The oscillating valve serves to connect the inlet and the exhaust manifold alternately to the cylinder and is therefore not required to withstand any considerable pressure difference. With this arrangement the valve is alternately heated and cooled by the exhaust and the incoming charge respectively. The oscillating valve can be made slightly conical if desired in order to compensate for wear. With the design shown in Fig. 2 the sleeve valve is completely balanced.

It will be noticed that this type of engine lends itself readily to a favorable shape of combustion chamber, the head casting being similar in general construction to that used in Knight engines.



Keister engine with one sleeve and one oscillating valve per cylinder. The sleeve can be arranged between piston and cylinder wall, Fig. 1, or be placed overhead as in Fig. 2

IN Great Britain there is a movement for producing standard samples of iron, steel and other industrial materials. The work has been in progress for about six years and twenty-three standard samples have been produced, covering practically the whole range of plain carbon steels, four alloy steels, two cast irons and a basic slag.

The organization provides machinery for the production and distribution of standard samples which are intended to be used by engineers in their chemical specifications and by chemists for checking and coordinating their routine tests and as an aid in settling disputes.

Although, so far, the movement has been confined to the preparation of standard samples of iron and steel, the same methods can be applied with equal efficiency to other materials.

Just Among Ourselves

General Motors Head Believes in Insurance

PROBABLY few persons in the industry know that there are only two men in the United States who carry more life insurance than Pierre S. du Pont, president of General Motors. His policies total \$4,000,000 while the life of Adolph Zukor, motion picture magnate, is insured for \$5,000,000 and that of Rodman Wanamaker for \$4,500,000. Another little known fact about du Pont is that he had more to do than anyone else with the development of smokeless powder. After he was graduated from the Massachusetts Institute of Technology he carried on his preliminary experiments in a private laboratory on the grounds of his mother's estate.

Ford Can Get Along Without Borrowing Money

HENRY FORD admits that he has \$200,000,000 in cash. The *Wall Street Journal* got worried about it the other day and asked him how much he had left after his recent purchases of huge tracts of coal lands and other rather large investments. Apparently some financial interests hoped he had cramped himself and might need a loan—at their terms. They haven't altogether given up hope of "getting" him yet but he evidently will be able to struggle on for a few weeks without assistance. He may even have enough left to meet his obligations in connection with Muscle Shoals if the next Congress decides to accept his proposal. Incidentally, anyone who thinks the Muscle Shoals question is a dead issue hasn't been keeping up with the procession. It's the liveliest issue there is in the South and the people down there aren't going to let it perish. If the Ford

offer is accepted it will be the biggest thing that ever happened for that section of the country.

Deluded Stockholders See Hopes Shattered

SOMETHING like 11,000 persons invested \$3,000,000 in the Parenti Motor Co. but the assets were sold the other day for \$225,000, less than half the amount of the claims filed against it in the Federal court. The saddest part is that the stockholders, who could ill afford to lose their savings, will get nothing. It is another speaking commentary on the inherent human desire to get rich quick. Glib stock salesmen painted beautiful pictures of the future and deluded mortals fell for it, just as they had many times before. There have been a good many failures of this kind in the brief history of the automobile but it is surprising there have not been more in view of the spectacular growth of the industry in the past decade.

Sanders Thinks Dealer Education Most Vital

L. D. SANDERS, who put the Boston Used Car Statistical Bureau on the national map and then resigned to go back into the business of selling automobiles, believes that solution of the used car problem is largely a matter of education. Dealers must be taught, in the first place, how to do business on a business basis. In the second place there must be built up among them a spirit of mutual confidence based on a code of ethics which will send beyond the pale men who indulge in cut-throat practices. He is convinced the only way the idea ever can be put over is by a big national program of education and enlightenment which would be sponsored both by

manufacturers and distributors through some central organization adequately financed. Sanders says such a campaign cannot be successful unless it is actively aided by the manufacturers.

Where to Find Salesmen Is Big Dealer Problem

NEXT to used cars, the average substantial automobile dealer is more interested in salesmen than anything else. He asks everybody he sees where he can find 'em and how he can develop their latent talents. The annual crop is mighty small and the wastage is terrible. The chief difficulty seems to be that they can't acquire the knack of getting names on dotted lines. Just as manufacturers are going out into the highways and "buyways" and picking dealers out of other lines of endeavor, so dealers are trying to get on their staffs bright young men with selling experience and ability. They actually welcome visits from insurance agents because they think they might find one who could sell motor cars. Some are trying to dig salesmen out of their shops. A few are trying to make the future really bright for the ablest of these young chaps by appointing them sub-dealers in the smaller towns and financing them until they get on their feet, by selling them cars on a consignment basis.

Road Isn't Always Easy Even for Manufacturers

MANUFACTURERS and dealers aren't always on the best of terms; but they should be. The success of one depends on the success of the other. The chief complaint of the dealer is that the maker tries to force cars on him when he can't sell them or when he is loaded up with used stuff. On the other

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

hand, the dealer wants cars when he wants them and he wants all he can sell. It may be that the producer has slowed up his output just because his dealers couldn't absorb all of it. Then there may be a sudden jump in retail demand and the sales organization clamors for more, forgetting that they can't be turned out in a minute. It probably would be a good thing for the industry as a whole if demand always were just a little bit ahead of production, but it's a hard nut to crack when competition is as keen as it is today.

Serious Used Car Jam Feared by Midsummer

THERE seems to be a growing fear in all quarters that there is going to be a terrific jam of used cars about midsummer. The market now is fairly good in most sections and active in a few, but it can't keep pace with the call for new automobiles with all the attendant trades. If the situation grows worse, and there is strong reason to fear it will, it will be serious for both manufacturers and dealers and it will afford a wonderful opportunity for real cooperation. Even if factories have to slow up for a bit it won't be an un-mixed evil. They should refrain, as far as they can, from doing anything which would injure their sales organizations.

Banks Setting Example In Service to Patrons

ONLY a few years ago banks thought it beneath their dignity to advertise any more than doctors, dentists and lawyers. It wasn't considered quite ethical. Then it gradually began to percolate through the gray matter of their directors that there was nothing either unethical or fool-hardy in telling the world about the service they had to give.

They had gone so far in a short time that the automotive industry might learn from them a good deal about real service. There are sixty banks in the United States, three of them in conservative New England, which have on their staffs agricultural experts who give sound advice to farmers on loans, crops, merchandising and the purchase of all kinds of supplies, including trucks, tractors and other machinery. The service is entirely free and is charged to advertising. When the farmer has any banking business he naturally will gravitate to the institution which has gone out of its way to give him service.

Politics Have Nothing to Do with Prosperity

HERBERT HOOVER has voiced the first governmental warning against the danger of over-expansion and mounting prices. He bases it on the production records established in various industries as reported to the Department of Commerce. The administration, therefore, has raised a cautionary signal in company with big bankers, financiers and other keen observers. From its point of view any business contraction, with a presidential campaign approaching, would be exceedingly unfortunate. As a matter of fact, however, politics and economics can't be mixed. The slump of 1920 resulted from the operation of economic laws and if there is a slowing up of business this year it will be from the same cause. The Harding administration deserves little credit for the prosperity we have had and little blame should be attached to it for any lack of prosperity while it remains in power. The president and his advisors can't control the law of supply and demand.

Haiti Sets Fast Pace in Highway Construction

THE little republic of Haiti, with a population of 2,000,000, mostly Negroes, and with a motor vehicle registration of 450 cars and trucks, has appropriated \$480,000 since December for road and bridge construction. The work which will be undertaken will relieve unemployment and the money placed in circulation will stimulate the economic improvement already apparent on the island. The grasp shown by the Council of State of the importance of highways in the development of trade should be an inspiration to those who are fighting for a continuation of the ambitious road building program well under way in the United States. Perhaps our tiny protege may yet make us blush for our laurels.

Big Corporations Plead for Heavy Trucking Road

SPEAKING of good roads, the highways committee of the Pennsylvania Legislature gave a hearing the other day on a bill for the completion of a great industrial highway with 100 foot right of way, from Chester to Philadelphia. Only four or five miles remain to be built but they will finish a heavy trucking route which will connect Philadelphia with Trenton and Chester with Baltimore and Washington. The unusual feature of the hearing was that great corporations sent their most learned counsel to advocate passage of the bill and completion of the highway. Among those who entered an appearance was the Baldwin Locomotive Works which makes steam engines for railroads. This company seems to have learned the value of motor trucks as a unit of transportation.

J. D.

American-LaFrance Makes Own Units for New Line of Trucks

Designs follow conventional practices but incorporate several novel details. 3½ and 5-ton sizes now in production. Features include self-aligning multiple-disk clutch, simple design of governor, counterbalanced crankshaft and wick-oiled knuckle.

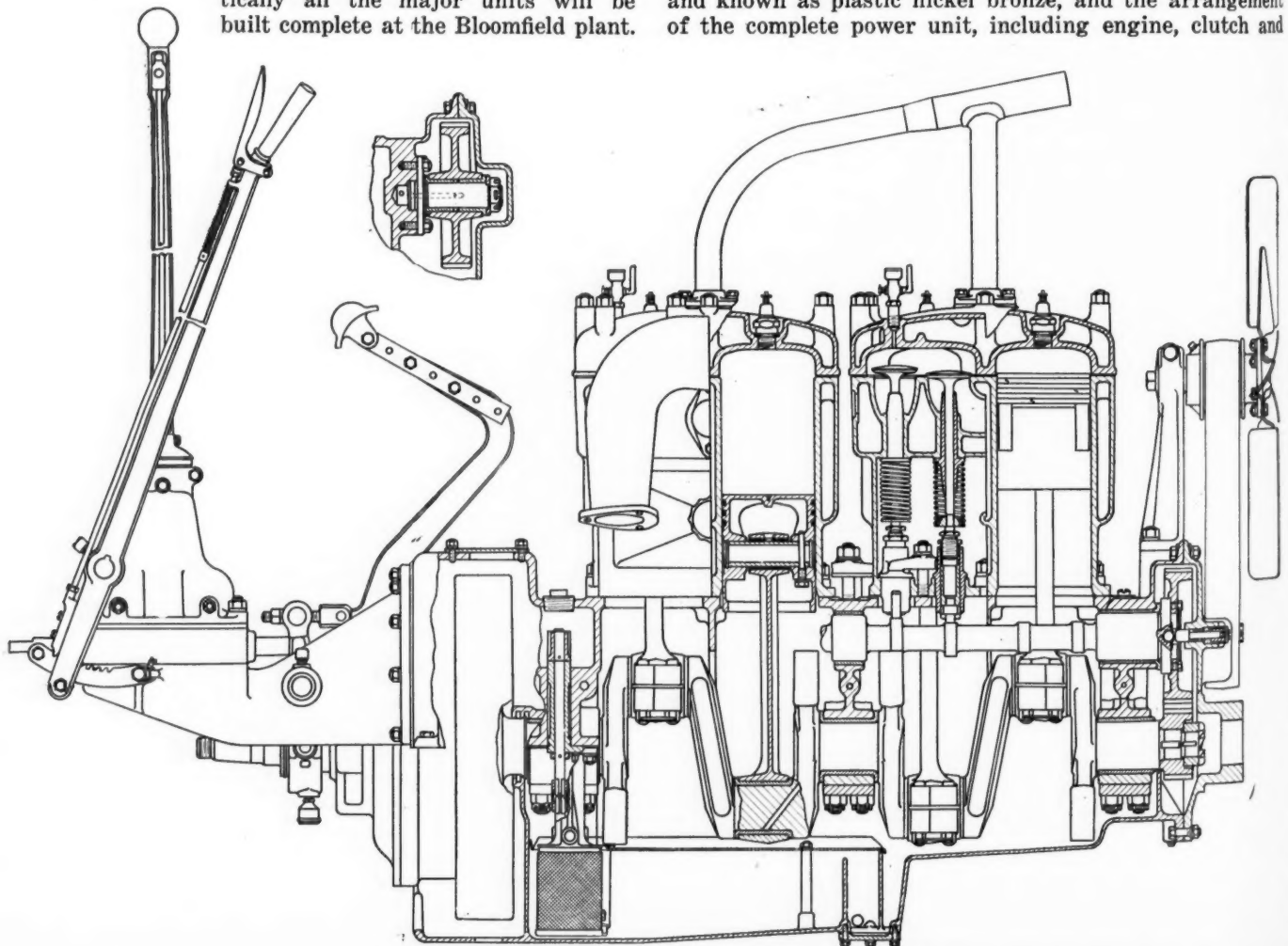
By Herbert Chase

FOLLOWING several years of successful production of motor driven fire apparatus, the American-LaFrance Fire Engine Co., Inc., has established an entirely new plant at Bloomfield, N. J., for the manufacture of commercial trucks, ranging in size from ¾ ton to 5-ton normal capacity. The company is already in production on 3½ and 5-ton sizes, which are substantially identical, so far as the major features of design are concerned.

These trucks are of original design, although conventional practice is followed in most particulars. Practically all the major units will be built complete at the Bloomfield plant.

Among the special features which do not follow conventional practice may be mentioned the self-aligning multiple-disk clutch which has three driving and two driven members, a simple design of governor with micrometer adjustment, a counterbalanced crankshaft of chrome nickel steel, a special design of sump, with provision for readily draining off sediment, a design of front axle knuckle, with wick lubricated pivot bearings, and an air-cooled gearset brake.

Other features include the use of bushings, made of special alloy, developed by the American-LaFrance Co. and known as plastic nickel bronze, and the arrangement of the complete power unit, including engine, clutch and



Longitudinal section of engine showing counterbalanced crankshaft and oil sediment dam with drain plate and plug for removing sediment

control levers in such a way that it can be quickly removed from the chassis and replaced by another unit when any extensive repairs on the engine are required.

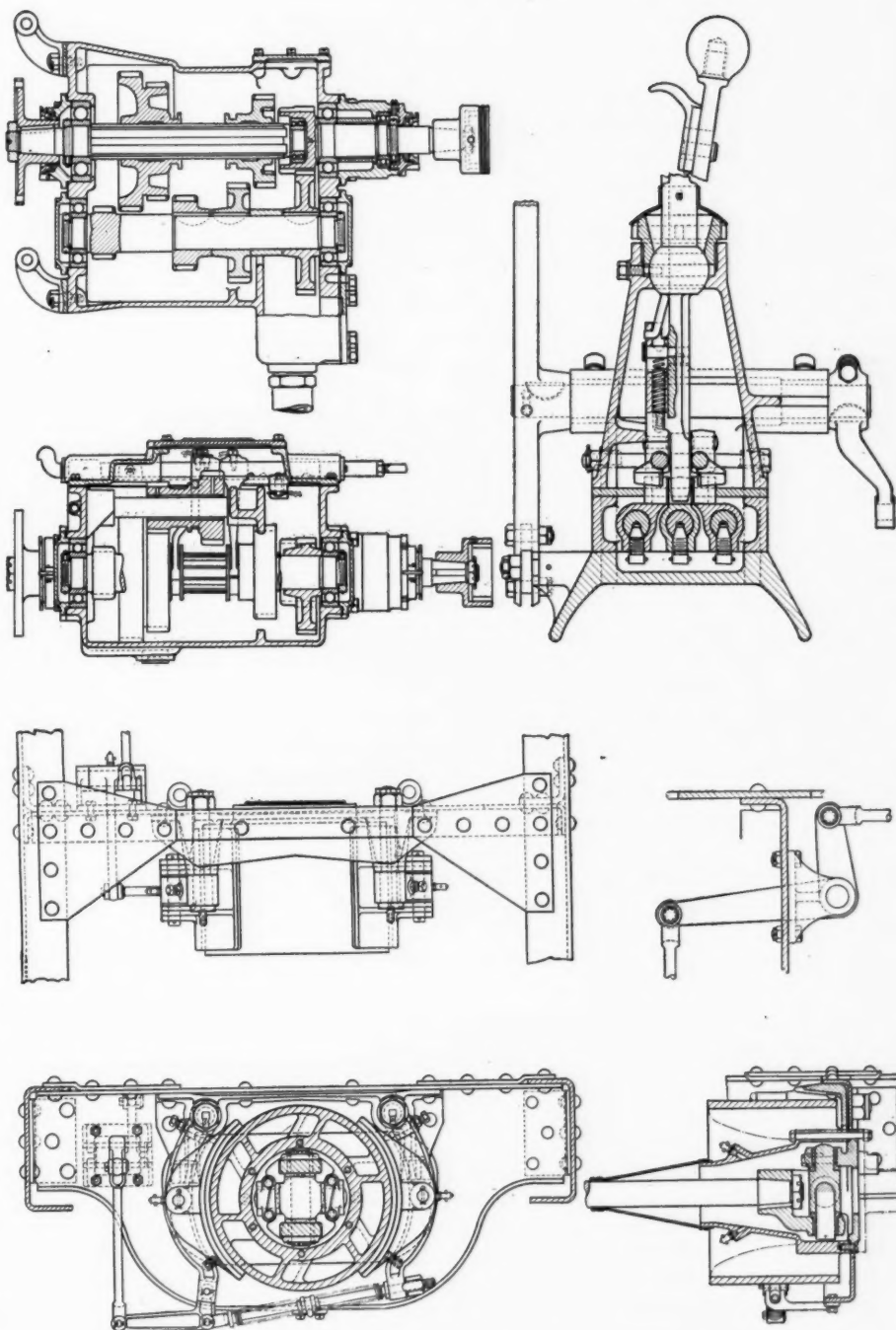
The engine design follows conventional lines in most particulars. The engine has $4\frac{3}{4}$ in. bore and 6 in. stroke and is said to develop 50 hp. at the governed speed, 1200 r.p.m. Cylinders are of L-head type and are cast in two pairs, each pair fitted with a detachable head. Care has been exercised to design the cylinder casting in such a way that water is brought adjacent to the valve seats throughout their entire periphery. The valves have $\frac{3}{8}$ in. lift and are $2\frac{13}{32}$ in. outside diameter. The inlet valve is of chrome-nickel steel, and the exhaust of tungsten steel. Roller followers are used between the cams and the valve tappets. Each pair of tappets is held in place by a yoke, which is easily removed, after the valve covers have been taken off.

The crankshaft is a three bearing type and is forged from chrome-nickel steel with integral counterbalance weights.

Wide faced helical gears are employed to drive the camshaft and the two auxiliary driveshafts. One of the latter drives the governor and generator, the other, water pump and magneto. The governor is a rugged type, from which small delicate parts are practically eliminated. Large steel balls, acting against the inner surface of a conical shell, are used in place of the usual weighted bell crank and lever arrangement. With the design in question no revolving levers are required and the spring which holds the throttle actuating lever in contact with the thrust bearing of the conical member is located on a separate spindle, the roller end of which bears against the throttle actuating lever at a point above the fulcrum. The socket which carries the spring spindle is pivoted and the position of the socket and consequently of the stop which controls the

maximum motion of the throttle lever actuating arm is determined by the position of a screw and locknut which enables a micrometer adjustment. When the desired adjustment is made, the screw and locknut are sealed to prevent tampering. A sectional view of the governor is shown in an accompanying cut.

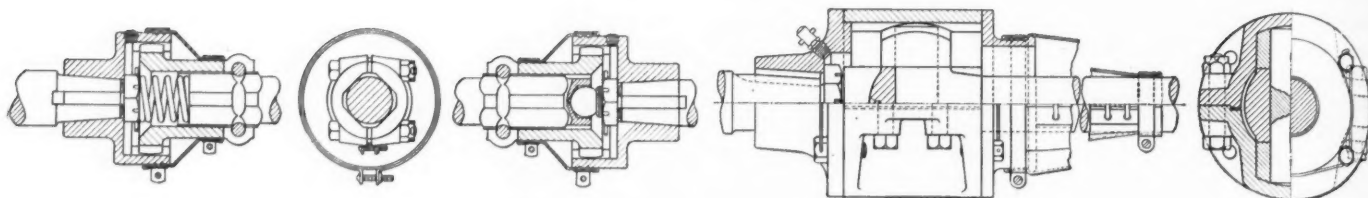
Particular attention has been paid to the lubricating system which is of the type designed to feed all main and big end bearings under pressure through a hollow crankshaft. The bearings of the timing gears and auxiliary driveshafts are also lubricated under pressure. All crankshaft bearings have bronze backs with babbitt lining and are screwed in place. The connecting rod bearings have four bolts. The fan is mounted on ball bearings, and is driven by a 2-in. flat belt from the left auxiliary driveshaft. The fan is of the sheet metal type and is



Above—Three-speed gearset and control used in $3\frac{1}{2}$ and 5-ton American-LaFrance trucks. Below—Gearset brake showing rigid mounting on frame cross-member. The drum is 12 in. in diameter by 8 in. face and has integral vanes for circulating cooling air

provided with an eccentric adjustment for taking up slack. The dimensions of main crankshaft bearings are as follows: Front $2\frac{3}{8}$ x 3 in., center $2\frac{3}{8}$ x 3 in., rear $2\frac{3}{8}$ x $3\frac{7}{8}$ in. The connecting rod bearings are $2\frac{1}{4}$ in. diameter by 3 in. long and the piston pin bearing measures $1\frac{1}{4}$ in. in diameter by $2\frac{1}{16}$ in. in length. All camshaft bearings are $2\frac{5}{16}$ in. in diameter.

The oil pump is driven by helical gears off the camshaft and is located at the lowest point of the sump in the lower crankcase. A particular feature of this system is the use of a partition or dam cast integral with the lower half of the crankcase which is intended to prevent sediment from reaching the cylindrical screen which surrounds the pump. As will be seen by reference to the longitudinal sectional drawing of the engine the oil which is thrown off from the bearings is caught on a plate



Universal joints of the internal-external gear type used respectively between clutch and gearset and at rear end of propeller shaft

which covers the sump. This oil drains off the plate and over a partition cast integral with the case. It then passes under this first partition and over a second partition, but at a very slow rate of speed so that the sediment has an opportunity to separate out from the oil while it is in the space between the two partitions. This space is provided with a drain plug as well as with a cover plate either of which can be easily removed for cleaning out the sediment chamber. The second partition tends to prevent the sediment overflowing into the main sump, and thus tending to clog the filter screen around the pump.

The engine has a three point suspension with a drop forged forward cross member fitted with a split trunnion surrounds the crankshaft.

The clutch has some rather novel features, among which the self-aligning pressure element already referred to, is one. This member is interposed between the toggles and the adjustable collar against which the single concentric spring bears. The bearing surface between the adjustable collar and the toggle pressure plate is spherical so that the last mentioned member is self-aligning and gives an equal pressure against each toggle. The use of toggles make it possible to employ a lighter spring and consequently lighter clutch pedal pressure than would otherwise be required.

Simple Clutch Adjustment

Adjustment of the clutch is effected by removing a single locking bolt and turning the threaded collar which bears against the pressure plate. The collar is reached through an opening in the clutch housing and the thread is fine enough to permit this member to be turned easily, after which it is again locked by the bolt the end of which enters one of the several holes in the adjustable collar.

The driving member of the clutch is a drum attached directly to the flywheel. To this drum are invited keys which fit into notches on the two loose driving disks. The driven disks are light and are fitted over a central hub

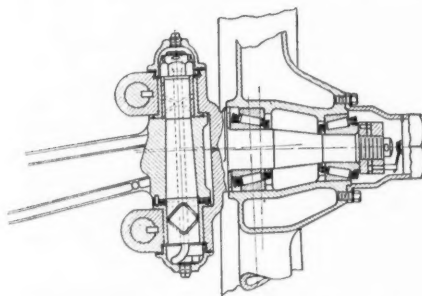
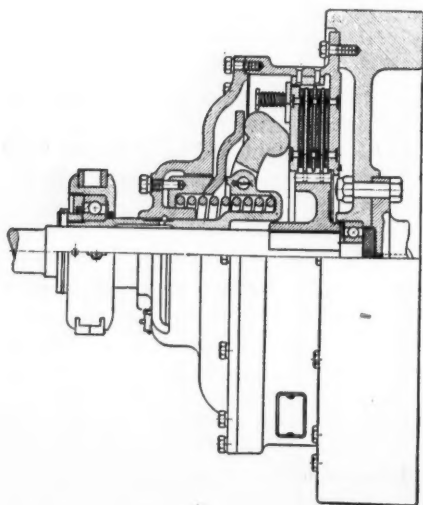
with large splined surfaces. Disengagement is facilitated by three auxiliary springs located near the outer periphery of the rearmost pressure plate.

Felt washers, fitted at the end of the rear main bearing of the engine, allow sufficient oil seepage to keep the pilot bearing of the clutch well lubricated. The clutch throwout bearing is an annular ball type, completely enclosed in a housing to which the disengaging trunnions are attached. The clutch shaft is fitted at its rear end with a flexible coupling of the internal-external gear type. This coupling permits of sufficient end motion to enable removal of the clutch without disturbing either the engine or the gearset.

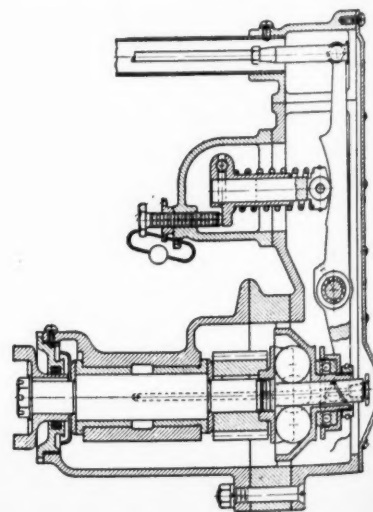
Four Speed Gearset Employed

The gearset is a four-speed type, with main and auxiliary shafts mounted on ball bearings. A double row bearing is used at the pilot end of the main shaft. The gearset case is fitted with a long gooseneck extending to a point near the outer edge of the frame in order to facilitate replenishment of the oil supply in the gearset. The gearcase has a three-point suspension and is so arranged that it can be easily removed from the chassis. Shifter rods, interlocks and forks are assembled to the gearset cover so that the gears are exposed to full view when the cover is removed. On the left side of the case an opening with cover plate, so arranged as to provide for mounting power attachments. The boss for this cover is made to S. A. E. standard dimensions.

To the rear of the gearset is a substantial frame cross member to which is attached the anchorage for the gearset brake. The drum for this brake is 12 in. in diameter and has an 8 in. face. The drum is cast with vanes connecting the hub to the outer flange. These vanes are so positioned as to act in the same way as the vanes of a centrifugal blower and thus move considerable air through the drum to assist in keeping it cool. Brake shoes are pivoted at their center and are carried on arms which are in turn pivoted to substantial anchorage brackets attached to the cross member of the frame.



*Left — Multiple-disk clutch with self-aligning member designed to insure equal pressure on toggles
Above — Sectional view of steering knuckle. Note complete enclosure of pin and wick oil feeds
Right — Sectional view of governor. Note location of spring and micrometer adjustment*



A star type metal universal joint connects the hub of the drum with the solid propeller shaft. At the rear end of the propeller shaft is a sliding universal joint, which, like that used in front of the gearset, is of the type using an internal and external gear arrangement. The external member of this joint is attached to a flange carried on a taper and keyed to the worm shaft of the rear axle.

Bar Axle Has Some Timken Fittings

The rear axle is fitted with a Timken worm and worm wheel and with Timken roller bearings, but all other parts of the axle are manufactured by the American-La France Co. to their own design. The housing is of cast steel with inserted tubes of drawn nickel steel which are securely attached to the axle housing, as will be seen in the accompanying drawing.

The axle is a full floating type, the live shafts being of chrome-nickel steel splined into the differential gears and driving plates at the wheel hubs. The worm and worm wheel assembly is attached to the cover plate and is removable therewith. Loss of oil from the worm or axle shaft ends is prevented by adjustable packing glands and oil collectors.

The wheels are mounted on taper roller bearings, over the axle tubes, and adjustment for wear is provided by suitable locknuts. Springs are attached to chairs or sleepers, fitted with bronze bushings which turn on the axle housing. Four lubricators with grease tubes are fitted beside the spring and supply the necessary lubricant to the spring chair bearings.

A forged torque arm of I-section is hinged to the central portion of the rear axle housing by a pin fitted with bronze bushings. The forward end of this arm is suspended from a cross tube by a swinging yoke fitted with a nickel bronze ball joint with hardened steel sockets. The drop forged radius rods are also attached to the frame by ball and socket joints which permit of free motion of the rear axle without undue distortion of the chassis or body.

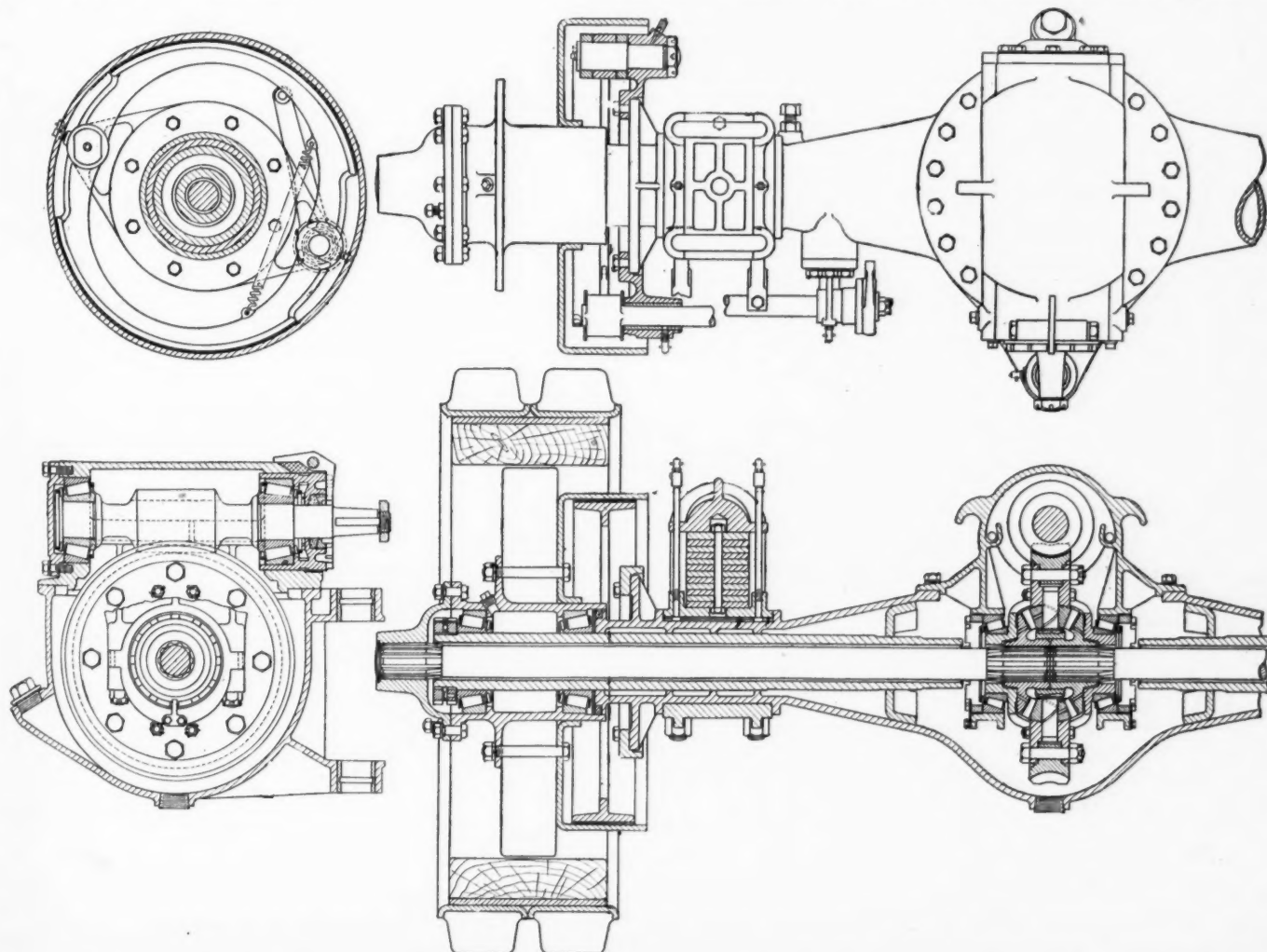
Hand operated, expanding brakes are fitted in drums attached to the rear wheel. Brake shoe actuation is by the usual cams on the outer ends of short shafts to which the brake levers are attached. These levers are fitted against a serrated flange. After loosening two nuts, the levers can be adjusted, thus taking up wear without changing the length of the brake rods.

All of the springs are of the semi-elliptic type, made from chrome silico-manganese steel and have heavy top leaves and graduated lower leaves. The front spring is 45 in. in length by 3 in. wide and the rear spring 55 in. long by 4 in. wide. Spring eye pins are held in the shackles by clamp bolts which pass through the pins.

Front Axle Knuckle Pin Fully Enclosed

A feature of the front axle is the use of a fully enclosed knuckle pin with an oil reservoir at the bottom. This pin is lubricated by a wick, which passes upward through the center of the pin and furnishes oil to all bearing surfaces.

The axle center is of I-section and the design is of the reverse Elliott type. The knuckle pins are tapered to



Full floating worm driven rear axle. This unit is equipped with heavy forged torque arm and radius rods

fit securely into the axle ends. Front wheel spindles are fitted with Timken roller bearings.

A semi-flexible type of frame is employed. The side rails are of chrome-nickel steel 9/32 in. thick, 8 1/16 in. deep with 3 in. flange width. The frame measures 36 in. outside and is 240 in. long with the standard 165 in. wheelbase. Longer wheelbase is provided when desired. The tread in front is 69 in. and in the rear 67 3/8 in.

Wheels are of cast steel with integral hubs, with wood artillery wheels as optional equipment; 36 x 6 in. single solid tires are used in the front and 40 x 6 dual solid or 40 x 12 single solid in the rear.

The foregoing specifications apply to the 5-ton model known as 5-R. The 3 1/2-ton model is similar in all respects so far as the design is concerned. The engines

are identical except for the cylinder castings which, on the 3 1/2-ton size, have 4 1/4-in. bore. The gearset and brakes are the same in both models but the frame and the axles, while following the same general design, are of lighter construction. Rear wheels on the 3 1/2-ton size are 36 in. in diameter.

The radiator is a fin and tube type in which the tubes are soldered into brass top and bottom headers. The radiator shell is made up of grey iron castings and is attached to the frame by a bolt and spring arrangement intended to relieve the radiator from twisting strains.

Equipment includes a cab with glass windshield side curtains, bumpers, radiator guards, two front and two rear tow hooks and pressure lubricating device for chassis parts.

Past Effects of Immigration Law No Basis for Future Estimates

IMMIGRATION statistics for 1922 with relation to the 3 per cent restriction law, while showing that "unquestionably the law greatly reduced the volume of immigration," do not afford a certain basis for estimating the future effect of the act on the industrial labor situation, according to the report of the Civic Development Department of the Chamber of Commerce of the United States.

The survey was the basis of the report of the Immigration Committee of the National Chamber, which recommended retention of the 3 per cent restrictions, coupled with an additional 2 per cent quota allowance in case of demonstrated need to be employed in making a practical test of selective restriction methods. Action by the National Chamber on the committee report is expected during the annual meeting of that body in New York next month.

The survey was made by direction of the board of directors of the National Chamber to cover "the effect of the 3 per cent immigration law upon labor in industry."

The survey showed that in 1922 (fiscal year), the first year in which the 3 per cent law was operative, excess of aliens admitted over aliens departed was 87,121 as compared to 552,132 in 1921, and 769,276 for the last comparable pre-war year, 1914.

"In this connection," the report of the survey said, "it must be remembered that the 3 per cent law does not affect all countries. The Asiatic barred zone remains as it was, and so do countries with which special treaties have been made (China and Japan).

Neighboring American countries; British North America, Mexico, the West Indies, and South and Central America have no 3 per cent limitation upon their nationals or upon foreigners who have lived there for five consecutive years or more.

Law Reduced Volume of Immigration

"Yet unquestionably the law greatly reduced the volume of immigration. Probably, too, it had some effect upon emigration through arousing in prospective emigrants a fear that they might not be able to return.

"During 1922 there also was a change in the proportions of the different elements among aliens admitted, both as to races and peoples and as to sex. The nations of Western and Northern Europe, while sending fewer persons, increased their proportion. So, too, all European nations, while sending fewer persons, increased their proportion of Hebrews and of females, and decreased their

proportion of laborers. Figures for the first months of the fiscal year 1923, however, indicate that conclusions cannot be drawn from 1922 statistics alone."

The survey report pointed out that consideration must be given to three things in gaging 1922 figures. These are:

First—That the fiscal year 1922 was a "bad year, economically, in the United States," and that experience proves that "bad years" coincide with decreased immigration.

"This would account," it was added, "in large measure, for decreased immigration from the countries of Western Europe which did not fill their quota in 1922. It would also account in large measure for the decreased immigration from abroad to Canada in the same year, for Canada had not changed its law."

Second—Religious persecutions impelled Hebrews to escape to America and were "independent of the economic conditions which inclined their Gentile fellow-countrymen to stay at home."

Third—Reluctance of aliens to leave the United States "for fear they could not return" prompted them to send for wives and children, with an obvious result in the figures.

First Year Conditions Unusual

"In short," the report continued, "the first year of the emergency law's operation may plausibly be held to have witnessed conditions which will not be repeated in other years."

Employers and both public and private agencies dealing with employment matters were interrogated during the survey as a means of the supply of labor in industry. The general situation over the country was indicated to be that "the visible supply of labor, both skilled and unskilled, is being used," according to employers' associations, while the government employment agencies furnished little definite information. The private agencies, however, gave a clearer picture showing work available for able-bodied men, while those under some handicap encountered about the same difficulties in finding employment as in pre-war years. Considerable regional variation was noted in the replies.

An effort to get figures on nationalities of employees among industries which "fear a handicapping shortage of labor" met with no success, as such statistics were unavailable in sufficient volume to check against immigration returns.

Tractor Design Improved Since 1920, Nebraska Tests Show

Eighty per cent fulfill original claims in 1922 as against 15.4 per cent three years ago. Prof. S. O. Sjogren criticizes current practice at S. A. E. National Tractor Meeting. Plans for general purpose tractor under way in several companies.

THAT marked advances have been made in the design and construction of agricultural tractors during the last three years is the outstanding conclusion reached by Prof. S. O. Sjogren of the University of Nebraska, who read a paper at the National Tractor Meeting of the S.A.E. at Chicago last Thursday.

Tractor tests have been held at the University of Nebraska during the years 1920, 1921, and 1922. In all 88 tests have been conducted, and the following results furnish the basis for conclusion that progress has been made:

	1920	1921	1922
Per cent of those completing tests and fulfilling all original claims.....	15.4	40.0	80.0
Per cent of those completing tests which could not develop power claimed under original specifications.....	41.5	26.7	20.0
Average increase of fuel economy of kerosene tractors (using 4-cyl. vertical motors) tested in 1922 over machines of same class tested in 1920.....	....	29.2	....

These percentages indicate clearly the advances which have been made by the industry during the last two years in the design and construction of agricultural tractors.

Professor Sjogren's paper was the first attempt to draw comprehensive conclusions from the mass of data yielded by these Nebraska tests. The conclusions reached by the professor were critical in their nature, but were advanced by him in a constructive attempt to point out wherein existing tractors fall short of perfection and to indicate the lines upon which design and construction must proceed for the future in order to produce a more nearly ideal tractor for farm use.

His paper was illustrated with curves showing the findings reached as a result of studying averages of all the tests made.

Difficulty in Lack of Standard Rating

An outstanding difficulty cited by Professor Sjogren was lack of standard rating of tractors both on the belt and on the drawbar. For purposes of comparison, a table of rating was made up in which the rated power was taken as 80 per cent of the maximum for both belt and drawbar. The chart showing this table revealed the fact that only 15 out of 76 tractors met this requirement on the belt, while 61 were rated above this. Seven of these were rated at a figure which they could not reach.

On the drawbar, 51 tractors came up to or exceeded the 80 per cent rating, while 22 failed to reach it. Of these 2 were rated at more than they could actually develop.

These results indicate that the rating of a large percentage of tractors is made upon a too narrow margin,

very little allowance being made for individual differences in machines nor for possible power reductions as the tractor becomes worn. In several cases tractors of different makes using the same kind and size of engines have been given ratings of wide variation. For instance:

Four tractors of different makes using the same engines are rated from 30 hp. at 900 r.p.m. to 35 hp. at 850 r.p.m. This is an increase of 16 per cent in rating with a 5½ per cent drop in speed.

Again, two tractors of different makes using the same engine are rated at 20 and 25 hp. respectively at the same r.p.m.; a difference of 25 per cent.

Definite Belt Speeds Should Be Set

A third case is of three tractors of different makes using the same engine, but rated at 12 hp. at 1000 r.p.m., 10 hp. at 1000 r.p.m. and 10 hp. at 1200 r.p.m.

Sjogren said: "These cases are sufficient to indicate a condition, for which there is no legitimate reason. A standard method of rating, conscientiously observed, would give a direct comparison of tractors from the power standpoint. This would tend to instill greater confidence in the tractor industry on the part of prospective users, if these latter can be made to see and realize that all tractors similarly rated can be compared upon the basis of power output."

The professor criticized the various belt speeds which now run from 1500 to 3500 ft. per minute. He believes that the time is here when some one or two definite speeds should be decided upon. Then all tractors should be equipped with pulleys to give one of these speeds at its rated r.p.m.

A considerable portion of Professor Sjogren's paper had to do with determination of tractor efficiency in its relation to total tractor weight. His conclusions, based upon the results of the tests, point to an increase of tractor efficiency up to a total weight of 4500 to 5000 lb., with a downward trend of the curve as total weights increase above that limit.

Wheel slippage, piston displacement as a basis for tractor rating, fuel consumption of various tractors with its relation to r. p.m., tractor weight and type of engine head construction, presented some interesting results, but the tests were too few in number to make the conclusions positive.

Accessories used in tractor assembly, such as cooling systems, clutches, carbureters, air cleaners, governors, etc., came in for considerable criticism. Fan belts, as part of the cooling system, were the chief offenders while fan bearings, pump packing, water lines and valves also were defective. Numerous troubles arose with clutches, owing

to lack of proper adjustment, poor assembly and other defects. In several instances carbureters were found to be of the wrong size to secure the best results. Consequently changes and readjustments had to be made. Air cleaners were in many cases too small, and where water was used the desirability of having the cleaner so designed that water could be added while the engine was under load was pointed out. Too many governors, according to Professor Sjogren, are governors in name only. Many of them are woefully ineffective. Too many tractor manufacturers in designing their machines pay too little attention to the comfort of the operator.

In conclusion, Professor Sjogren made the following recommendations for remedying many of the defects he criticized:

1. More rigid tryouts in the fields under various conditions before the tractor is finally approved for production.
2. A choice of accessories based upon a thorough study of same as related to the particular machine in question.
3. More rigid inspection of parts as well as of the finished machine.

Questions Wheel Slippage Conclusion

The discussion following Professor Sjogren's paper was confined largely to questions, answers to which elucidated further some of his conclusions. Only one objection to the conclusions of the paper was presented. Vogt of the Allis-Chalmers Co., questioned the validity of the conclusion advanced relative to wheel slippage. Vogt contended that as the wheel slippage had been estimated by observing the revolutions of only one of the drive wheels the conclusion had no validity. He contended that revolutions of both wheels should be observed and the results coordinated. Vogt presented a written criticism of the methods employed in conducting the Nebraska tests, bas-

ing it largely on wheel slippage data. This was not read before the meeting, but will be published in the proceedings of the society.

C. M. Eason, who was to have presented a paper on the general purpose tractor, merely submitted his paper for publication in the proceedings and contented himself by presenting a series of stereopticon views portraying the development of the agricultural tractor from 1880 to date.

General Purpose Tractor Makes Progress

Eason said that the tractor question, as far as a general purpose tractor is concerned, already has been solved for the farmer who can afford to have two machines; one, preferably a 3-plow capacity machine for plowing and other heavy work; the other, a general purpose machine of the conventional motor cultivator type or a small tractor of the Toro or Parrett type.

However, many farmers cannot afford such an elaborate power equipment for their farms, hence a medium priced, medium powered, general purpose machine is desirable which will accomplish all the usual farm tasks on the average diversified farm.

What progress may be made toward the development of such a machine, Eason did not say. He said that many tractor concerns are working on the problem. In connection with his talk, pictures portraying the activities of the International Harvester Co. in connection with a general purpose tractor were shown. He, too, said progress was being made but that up to date no new type of general purpose tractor had been developed to the point where it satisfactorily met the requirements or which was ready for the market, nor did he prophesy when one would be.

The attendance at the meeting was surprisingly large, indicating a revival of interest in the tractor industry which is most gratifying to farm equipment men.

Lincoln Highway Rapidly Approaching Finished State

THE Lincoln Highway is 90 per cent a paved road from New York City to 45 miles west of the Mississippi River. By the end of this season there will be less than 60 miles of unpaved road out of the first 1100 miles west of New York City.

Work is rapidly progressing with Federal aid between the Mississippi River and the Pacific coast and already after ten years of effort the completion of the route can be foreseen. It now carries a tremendous local, interstate and cross-country traffic.

The following table provides a picture of the amounts invested in the improvement of the Lincoln Highway 1914 to 1922 inclusive and shows the continuous progressive development of the route. In 1922, 235 miles of new construction were completed at a cost of over six million dollars. A greater mileage will be finished this year.

1914.....	\$1,200,000
1915.....	2,580,280
1916.....	4,580,165
1917 (war).....	2,500,918
1918 (war).....	2,996,307
1919.....	9,386,800
1920.....	8,422,060
1921.....	9,472,906
1922.....	6,046,168

Total.....\$47,185,604

During the past ten years, the Lincoln Highway Associa-

tion, with headquarters in Detroit, Mich., has brought the Lincoln Highway near to completion through its educational efforts and the expenditure of over \$900,000, and has aided in bringing about the national recognition of the need for better highways which now exists.

This year the route will be in the finest condition of its ten year history and will carry over 60,000 cars across the continent during the touring season between June 1st and October 15th. The only real difficulty will be encountered in western Utah.

DURING the last three months of 1922 the motor buses of Paris carried 239,969,128 passengers and took 76,633,649 francs in receipts. The most successful line was that following the main boulevards from the Madeleine to the Bastille, on which 4,500,000 passengers were carried in the three months, giving a receipt of about 1,500,000 francs. For this line the company is now building 50 six-wheel omnibuses having a bigger capacity than those at present in service. For service outside the city limits a smaller 23-passenger bus is under construction.

Experiments have been made during the past six months with a pneumatic tired bus, but no change in this respect is expected in the near future. The omnibus company is also experimenting with front wheel brakes.

Growth of Specialized Companies Helps Latin-American Sales

Prospects for this year's business most favorable. Use of motor vehicles gains as transportation value becomes known. Merchandising activities improving. Road construction opening up rural sections. Stocking replacement parts a major problem.

By R. J. Archer

Vice-President and General Manager, The John N. Willys Export Corp., Toledo

THE sales of motor cars in the countries of Latin America and the West Indies will be considerably increased this year over last and there are many hopeful signs of the future development.

This is the chief impression resulting from an extended trip during the last five months in an investigation of the automotive industry in Venezuela, Brazil, Uruguay, Argentina, Chile, Peru, Ecuador, Central America and the islands of the West Indies.

Many complex and difficult problems stand in the way of the companies selling automobiles in these territories but, nevertheless, the automobile is being used more and more as a vehicle of transportation, prices are being brought down and, with the better financial conditions, larger sections of the population are potential car owners and buyers.

Some splendid local companies are engaged in the automobile business throughout all sections of Latin-America and fine service stations have been opened not only in the larger cities but as well in many of the smaller sections. Specialized automobile sales companies and wholesale and jobbing concerns devoted exclusively to the handling of automotive equipment and accessories are in existence and their business may be expected to grow.

One of the major difficulties confronting these companies, as well as the smaller dealer and distributor organizations, is that of the parts stock and keeping of sufficient parts to handle properly the maintenance of the many cars now in service and those which will be put into use in the coming months. Steps, however, are being taken to remedy this condition, which must be done if the use of automobiles is to expand in any volume.

More Widespread Use

The automobile is being regarded in a different light today than it was a short time ago. It is coming into more widespread use both in the cities and the rural sections. Distributors should, and many of them are, enlarging their sales effort by the appointment of dealers and sub-dealers in the smaller interior cities and towns and, as financial conditions make this possible, sales in the rural districts will become a more important factor in the general business. In Argentina and Uruguay, this part of the industry has been built up tremendously; a similar development may be expected elsewhere. Its extent will depend, of course, largely upon the efforts made from the chief centers to open up such sales outlets.

The general improvement is not the same in every country and, naturally enough, some sections are ahead

of others in working back to normal and more prosperous conditions. Likewise, the use and the sales of automobiles are not everywhere similar. In some places automobiles are being handled by companies organized exclusively for this purpose, but everywhere the tendency is toward specialization which permits better and closer merchandising methods. This condition is coming about in one way or another and has made its greatest progress on the East Coast of South America and in some parts of the West Indies, particularly Cuba and Porto Rico.

Battery Ignition Should Increase

Attention may also be called to the status of the storage battery and the general subject of ignition service. There is a considerable increase of new cars being purchased with battery ignition, as service on batteries has kept step with the battery being installed in cars, with improved knowledge on the part of car owners on what the battery really is.

The magneto on cars to South America must necessarily be priced at an advance over the distributor system and, as each dollar of the original invoice is magnified by the usual ad valorem rate of duty, it becomes an objective, especially on low priced cars, to take battery ignition.

Anyone who visits the chief automobile centers in these countries should realize what a big place the automobile has attained. It is bringing about the construction of roads and is opening up communications that have never existed before. It is a vital agent in promoting progress and growth and will become increasingly so in the years to come.

The road problem presents many complex angles. Most of the cities are to be congratulated upon the fine streets and boulevards, but connecting links between different cities or towns often have not been built. Of course, many exceptions to this general statement must be made as in some sections such roads have been built and in others extensive highway construction is being contemplated. Undoubtedly the demand for better roads is becoming more widespread and more insistent and numerous automobile dealers and automobile associations have been very active in pushing highway activities.

Merchandising Methods Improve

The merchandising activities of some automobile firms are worthy of the highest commendation. Effective search is made for prospective buyers. Salesmen then seek them out diligently and every effort is made to turn

them into actual owners and users of automobiles. This happy condition is in contrast to other cases where little attempt is really made to sell automobiles, the sale being left to the chance possibility that buyers may walk into the stores. In one particular case the names of possible owners are obtained from telephone directories, newspaper advertisements, published lists, etc., the prospects being followed closely by a salesman who often is able to effect a sale and add another member to the great family of motor car owners.

Where merchandising efforts of this character are not made, the salesmen await actual inquiries instead of attempting to interest possible users. The rush of competition and the growth of the industry will change such methods, but every distributor and dealer should give careful consideration to this part of his business efforts.

The changing conditions in this regard, however, are evidenced by the larger amount of advertising which is being done both in newspapers and in magazines, and through the use of billboards, signs, etc. Advertising campaigns have been enlarged considerably in some cases and there is a greater insistence that sales efforts of this character be carried out.

Financing Systems Changing

It was of particular interest to note the financial arrangements by which automobiles are being sold. These varied considerably in the different countries. In some places, cars could be bought only for cash, with full payment when the car is delivered to the buyers. In other sections, the most liberal terms are offered, with payments spread over a considerable period of time. As financial conditions improve, it is possible that considerable changes will be made in this regard and that the time payment arrangements will be more widely extended.

Also, used cars should be taken in trade more freely in some sections. The dealers and distributors in certain large cities rarely take in used cars on new sales. Often, they will do this only if the old vehicle is of the make they are handling. At other times the dealer will take the cars in and sell it for the account of the new buyer, crediting him with whatever is obtained on the sale.

Used car markets need to be built up and, if this is done, there should be quite an enlargement of sales. Of course the large number of very old cars of comparatively little value in some cities has prevented the more general practice of trading. Dealers can scarcely take in these old automobiles and expect to resell them successfully. Yet if dealers and distributors will arrange to trade in used cars making definite terms with their customers their sales of new vehicles should increase as there are many owners in every locality who can and should have the newer models.

Another interesting development which is quite noticeable is the changing character of the buying demand. Cars are being bought as transportation vehicles and less and less for purely luxury and pleasure driving.

Price has become a greater factor and the standard stock models are more frequently sold. One particular instance is in regard to the finish of a car. It used to be that special colors and finishes were frequently demanded. But buyers will hesitate today when it comes to paying the \$50 to \$100 additional expense and will end up by taking the standard stock model, finished perhaps in dark blue or black. The standard models are now being sold in a great majority of cases due solely to the financial conditions involved. This is a significant indication of the changing character of sales.

Cars are being bought—that is, generally speaking—on the basis of price and price value. They cannot be overpriced if the public is to buy them. As the use of automobiles has increased so also has the motor knowledge of buyers and owners. The result is that every possible saving must be effected in the production, handling, sale and service. Otherwise sales will be restricted to a minimum.

Speed No Longer Paramount

One more factor of a similar character might be mentioned. That is, speed. Hundreds, perhaps, thousands of automobiles have been sold in previous years solely because of their speed qualities, not because of any other consideration. But it is being learned that excessive speeds cannot be utilized and that traffic and road conditions prevent or limit driving at high rates of speed. Under these conditions, other qualifications become of major importance, such as comfort of driving, freedom from mechanical trouble, economy of operation and maintenance, cost, acceleration, smoothness of performance, hill-climbing ability, etc. That owners and buyers are paying greater attention to these characteristics and not so much to speed is apparent nearly everywhere.

To sum up it may be said that much progress may be expected and that considerable development of merchandising, sales and service methods is under way. The automobile is the natural answer to the former slower and uncomfortable forms of transportation and people in the territory visited are too observant of personal comfort not to adopt it.

Dealers can look to the future with confidence, knowing that the automobiles of today are the best that have ever been built and that being priced as they are they represent the best value ever offered.

Air Association Makes Progress

THE International Air Traffic Association recently held a meeting at Wiesbaden, Germany. Represented at the meeting were the Koninklijke Luchtvaart Maatschappij (Holland), Danske Luftfartselskab (Denmark), Deutsche Luft Reederei (Germany), Daimler Airways Co., Handley-Paige Transport Co., Instone Air Line (England), La Snet, Compagnie Franco-Roumaine and Messageries Aeriennes (France).

Only one of the companies, the Deutsche Luft Reederei, furnished a complete report of its operations, but all members agreed to furnish semi-annual reports to the secretary during 1923. It was decided to prepare technical instructions for night landings and submit them to the International Commission on Aerial Navigation, which alone is qualified to regulate air traffic.

The public authorities are to be requested to permit the transportation by air craft of parcels weighing less than 11 lb. without the certificate of origin now demanded, which has been the cause of much annoyance in the past.

Reduced membership fees are to be granted to members handicapped by an adverse rate of exchange. All time tables are to be submitted to M. Woolf of the Danish Air Traffic Co., who is a specialist in this field, to the end that he may coordinate them among themselves and also with other modes of traffic.

Many other problems were discussed and it was decided to cooperate as far as possible with the International Committee for Aerial Navigation in the future. The next meeting of the Air Traffic Association will be held in Brussels in July.

Proper Positioning of Tappet Lever Lessens Valve Mechanism Wear

Correct layout with respect to the end and the axis of valve stem results in reduction of sliding motion. Pure rolling action a prime requisite. Question of material of secondary importance. Investigation desirable for every new design.

By Glenn D. Angle

In charge of airplane engine design, Engineering Division, Air Service

SOME of the simplest problems encountered in engine development are often the most troublesome. A problem of this nature is the subject of the following discussion, which considers a typical case of the principal cause of wear on the tappets, tips of the valve stem, and valve guides of a rocker arm mechanism.

When two moving bodies become worn upon the surfaces in contact, we have evidence that sliding action occurs. The amount of wear on two bodies of a certain shape in a given length of time depends, of course, upon the unit pressure, the nature and hardness of the surfaces, and the quantity and kind of lubricant supplied. For convenience in the discussion, we will assume that these conditions are the same in every case.

Pure rolling action is a prime requisite if the wear in any mechanism is to be entirely eliminated. Since the action between the tip of the valve stem and a tappet, which moves in an arc, is both rolling and sliding, it fol-

lowed the same test. The side pressures, which are highest toward the cylinder axis, have been sufficient to either wear through the wall of the guide or to have worn the guide so thin that it cracked under the imposed load. These guides have now reached a point where a valve can be easily jammed by side loads and thus cause a major failure in some member of the valve mechanism.

The first attempt to overcome this condition was the substitution of a harder guide material. Chilled cast-iron guides with a combined carbon content of not less than 70 per cent was tried. Material of such hardness is impractical, of course, from a manufacturing standpoint, mainly because of the excessive wear on the tools, especially the reamers for the hole, which must be held to close limits.

Harder Guide Material No Cure

The harder guide material did not reveal the improvement expected; therefore, it was finally decided to again examine the tappet action, despite the fact that the original layout of this mechanism had been made with a view of reducing the sliding action of the tappet to a minimum. This investigation disclosed that a very minor change had been made in the original layout—probably during the course of other modifications in the cylinder design—which caused a different tappet action.

The tappet action causing the wear referred to above is shown diagrammatically in Fig. 3. The point *O* is the fulcrum of the rocker arm, line *OK* is horizontal, and the line *ON* is normal to *LM*, the center line of the valve

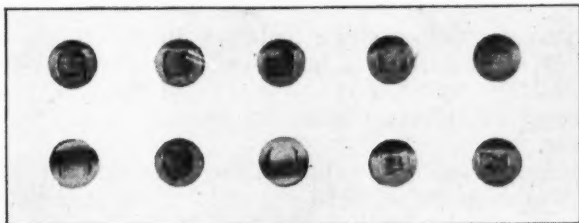


Fig. 1—Wear on valve tappets due to excessive sliding action

lows that the sliding action should be carefully studied with a view of reducing it to a minimum.

The friction due to the sliding motion between these surfaces in turn produces side pressure of the valve stem which causes wear in the guides. The rate of wear in the guides is generally more rapid than the wear which occurs on the tappet and valve stem, because the material used for guides is seldom as hard or as well lubricated. If the guide wear is excessive, the valve stem will soon become loose and thereby permit gas leaks; also the movement of the valve is then not sufficiently confined to insure proper seating in the cylinder.

The results of incorrect tappet action are exhibited in Figs. 1 and 2. The tappets shown in Fig. 1 have deep grooves the width of the valve stem diameter worn across their faces and are, therefore, unfit for further service. This wear occurred within 35 hours of operation, and during this time a great deal of trouble was also experienced with leaky and burned valves.

The valve guides shown in Fig. 2 were used during the

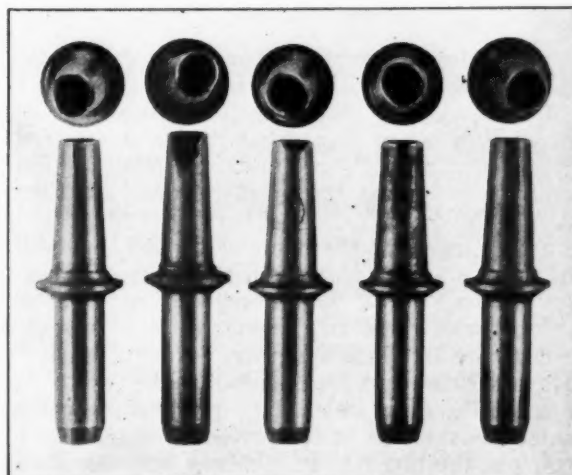


Fig. 2—Excessive valve guide wear caused by high side pressures

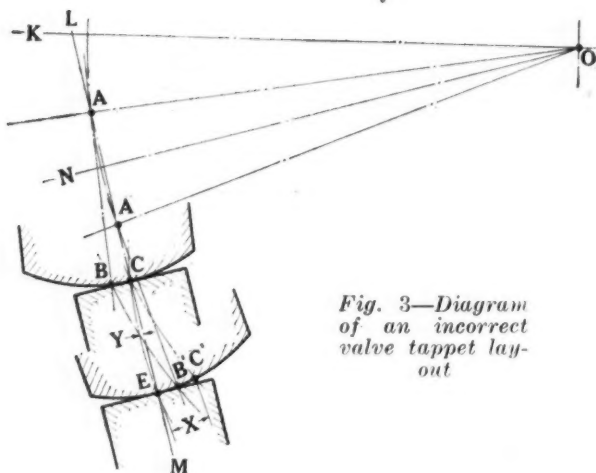


Fig. 3—Diagram of an incorrect valve tappet layout

stem. The relative location of the tappet and valve stem is shown for both the open and the closed position of the valve. A is the center of the tappet radius, and AB the center line of the tappet at "valve closed" position. When the valve is at full lift, A has moved to A', and A'B' is then the center line of the tappet.

The point of contact (C) is on a line normal to the end of the valve and passing through A, the center of the tappet radius. When the valve is open, the point of contact (E) falls on a corresponding line through A'. The arc CE is, therefore, the path of the point of contact, and Y represents the distance that this point has moved across the end of the valve stem. On the other hand, the point of contact on the tappet has traveled from C' to E, the former corresponding to point C on the tappet

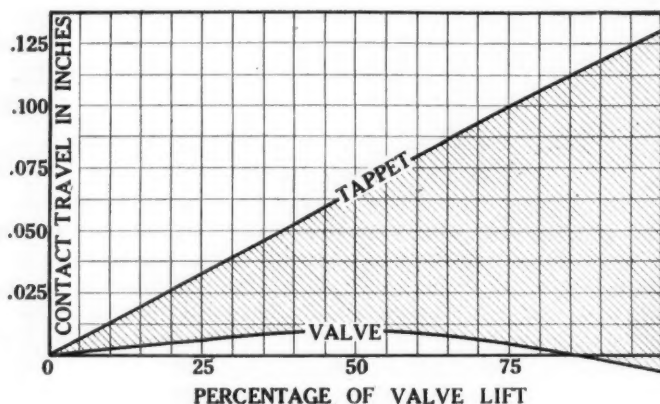


Fig. 4—Relative travel of point of contact with incorrect valve tappet layout

at the "valve closed" position. The distance denoted by X is much greater than Y, the corresponding travel of the point of contact on the valve stem. The relatively greater amount of slippage on the tappet, which is evident by a comparison of X and Y, accounts, no doubt, for the side pressures which caused the excessive wear in the valve guides.

The actual travel of the point of contact, on both tappet and valve stem, is plotted on the basis of percentage of valve lift in Fig. 4. The divergence in travel, or the slippage between these two members, is represented by the shaded portion of the diagram.

The layout which appeared to produce the results desired is shown by Fig. 5, in which the corresponding points are designated the same as in the preceding diagram. In the first example, the line ON was midway between A and A', the two positions of the center of the tappet radius. It will be observed in the revised layout, that the end of the valve stem is raised, the point of contact (C) for the

"valve closed" position now being located about one-third the distance of valve lift above ON, the line drawn through the rocker fulcrum normal to the center line of the valve. The corresponding amounts of travel of the point of contact on the tappet and the valve stem, represented by X and Y, are now found to be more nearly equal.

Fig. 6, the diagram of actual travel plotted with respect to percentage of valve lift, shows an appreciable reduction in the amount of slippage. To the "valve open" position the maximum slippage is only 0.0125 in., while to the corresponding position in the preceding case, the slippage measured 0.137 in. In addition to the reduction in slippage, another feature of interest is the crossing of the lines of travel. This indicates that the side pressures are acting in both directions; hence the wear in the valve guides is distributed on both sides.

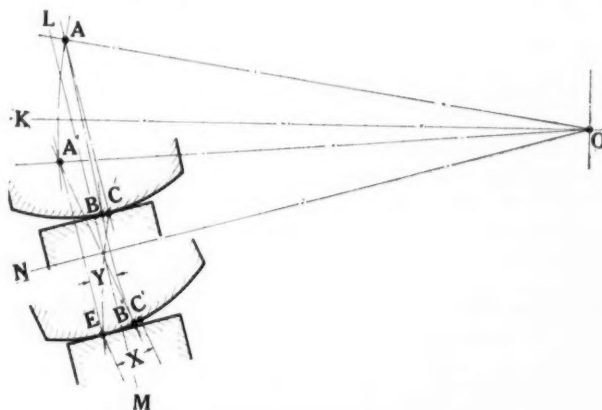


Fig. 5—Diagram of corrected valve tappet layout

The subsequent tests, which were made on this modified valve gear, did not reveal wear of any consequence on either tappets, valve stems, or guides. It was, therefore, safe to conclude that the action of the tappet was almost entirely responsible for the trouble experienced with the first design. Softer guide material, in which the combined carbon content was in the neighborhood of 0.50 per cent, was also tested, along with some of the hard guides, but no great difference could be detected in the amount of wear.

It was interesting to note that the few guides, in which wear was measurable, were generally those made for the harder material. This would lead us to conclude that the action of the tappet is the most important consideration in the study of guide wear, the question of material being only of secondary importance.

Returning again to the discussion of tappet layout, it is desired to direct attention to the incorrectness of a method employed by some designers in layouts of this

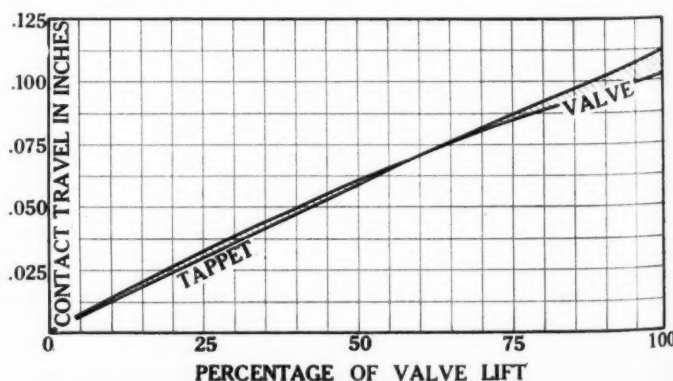


Fig. 6—Relative travel of point of contact with corrected valve tappet layout

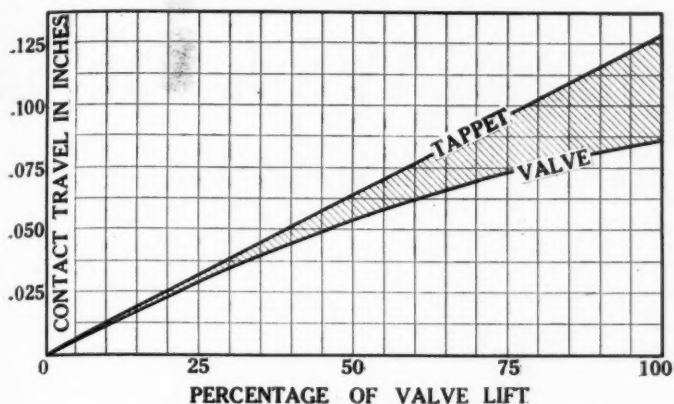


Fig. 7—Relative travel of point of contact when the end of the valve stem travels equal distances each side of a line which is normal to the valve axis and passes through the rocker fulcrum

nature. This concerns the location of the end of the valve stem with respect to a line that is normal to the valve axis and passes through the fulcrum of the rocker arm, such as line *ON* in the preceding diagrams. As mentioned before, the end of the valve stem in the corrected design was located above this line a distance equal to one third of the lift. However, some prefer to make this distance equal to one-half the lift, or, in other words, divide the travel of the end of the valve stem equally about the line normal to the valve axis.

In order to illustrate clearly the incorrectness of this latter arrangement, the actual travel of the points of contact on tappet and valve stem has been plotted in Fig. 7 for the valve stem of the above layout located in this manner. The maximum slippage to the "valve open" position measures 0.042 in., or 3.36 times as much as in the corrected design. Furthermore, the lines of travel do not

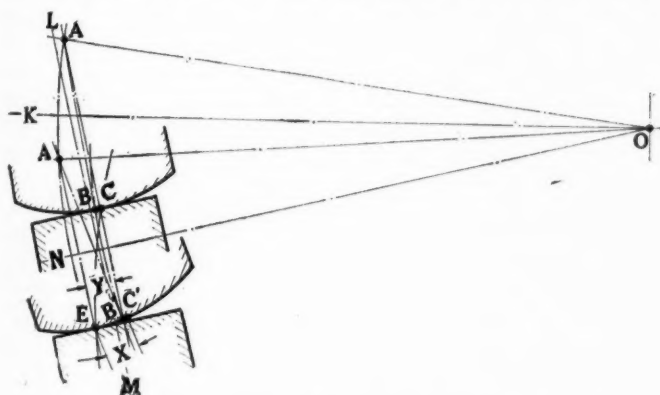


Fig. 8—Diagram of Liberty engine valve tappet layout

cross; hence the side pressures of the valve stem are continually directed to one side.

In the valve guides of the Liberty engine, which also employs a rocker arm valve mechanism, there is rarely any wear in service. This engine has been extensively used, therefore a study of its tappet action should serve as an excellent check on the results of the above investigation. A diagram of the Liberty tappet, with the various points similarly designated, is shown by Fig. 8 at "valve open" and "valve closed" positions. It will be observed that *X* and *Y*, the distances of point-of-contact travel on the tappet and the valve stem, respectively, are practically the same. Our chief interest lies in the fact that the end of the valve stem for the "valve closed" position is above line *ON* about one-third the distance of valve lift.

On Fig. 9, the points-of-contact travel on both tappet and valve stem are plotted with respect to percentage of valve lift in the same manner as before. The slippage, which is represented by the shaded portion of the diagram, is practically the same as that determined for the corrected valve gear. The maximum slippage to the "valve open" position is only 0.010 in., being even slightly less than the maximum slippage measured on the best example examined above. During the first three-quarters of the lift, the slippage at no time exceeds 0.0025 in.

It will be observed in Figs. 6 and 9 that the crossing of the lines-of-contact travel occurs after the valve is half open. This is obviously desired, since the lines diverge more rapidly beyond this point, and the maximum slippage is therefore less than if the point of crossing occurred earlier in the lift. A slippage from 0.010 to 0.015 in. to the "valve open" position is not serious because we have a decrease in the lever arm which might cause bending strains in the valve stem. Moreover, the forces of inertia are greatly reduced at this point and for a given amount of slippage wear would not be so rapid. The slippage should be a minimum at the beginning of the lift, especially in

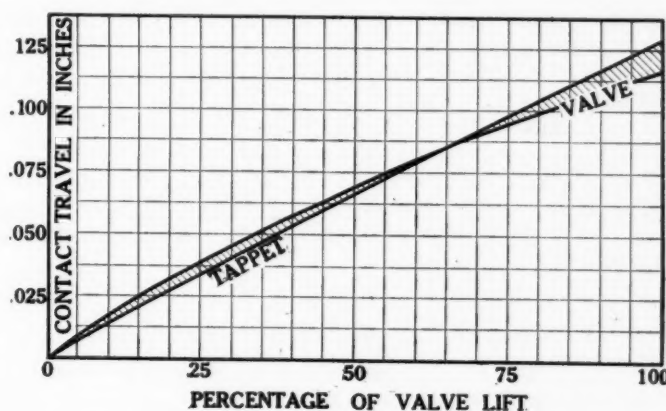


Fig. 9—Relative travel of point of contact with Liberty valve tappet layout

the case of the exhaust valve, because of the high gas pressure upon the valve.

It is concluded from this investigation that, for all practical purposes, the end of a valve operated by a rocker mechanism, when the valve is in the closed position, should be located about one-third of the lift above a line through the fulcrum and normal to the valve axis. However, it is recommended that, when time permits, a similar investigation be conducted for any new tappet layout, if only for the sake of completeness. The results are at least interesting and may lead to the detection of a cause of trouble.

SIR HERBERT AUSTIN, M. P., a prominent British automobile manufacturer, speaking before the Midland Union of Manufacturers at Birmingham recently, predicted that the British production of motor cars during the next twelve months would be 75,000, and also predicted that 50,000 cars would be imported from the United States.

Austin gave as some of the reasons for the heavy importation of low priced American cars the low margin of profit with which American parts manufacturers were content, that American workmen put twice as much energy into their work as British workmen, and that in American plants every item of a manufacturing program was considered in advance, then the necessary money invested in tooling and the job carried through with determination to success.

Wright-Navy Development Work Yields Great Increase in Engine Life

Changes in valves, valve seats, cylinder design and bearing metal multiply durability and render overhauls much less frequent. Some parts show no sign of failure after total of over three weeks operation at or near full load with high m.e.p.

By Lieut. B. G. Leighton and R. M. Parsons
Bureau of Aeronautics, Navy Department

RESULTS of tests of the Model E-2 Wright engine recently completed by the Bureau of Aeronautics, Navy Department, indicated very conclusively that the operating life between overhauls with new engines recently developed may be expected to be at least six times the life which has in the past been realized with service types of engines.

The particular test here described was a continuation of previous development testing, during which faults in the engine had been uncovered and presumably corrected.

The latest test was discontinued after a total running time of 572 hours, due to the failure of a main crankshaft ball bearing.

The performance of the engine on this latest test is considered remarkable, in that the vital parts of the engine have shown durability characteristics far superior to those which have been evidenced in tests of other types of engines previously in use.

The crankcase, crankshaft, connecting-rods, main and connecting-rod bearings, in fact, all major parts of the

engine, except the cylinder blocks, were operated without repair or adjustment throughout the entire 572 hours of running. The new cylinder blocks have run for a total of 310 hours at full power, and upon examination at the end of the test showed no evidences of failure; valves, valve seats and all valve-actuating mechanism, except valve springs, were in excellent condition, and apparently capable of running without repairs or adjustment for a considerably longer period of time.

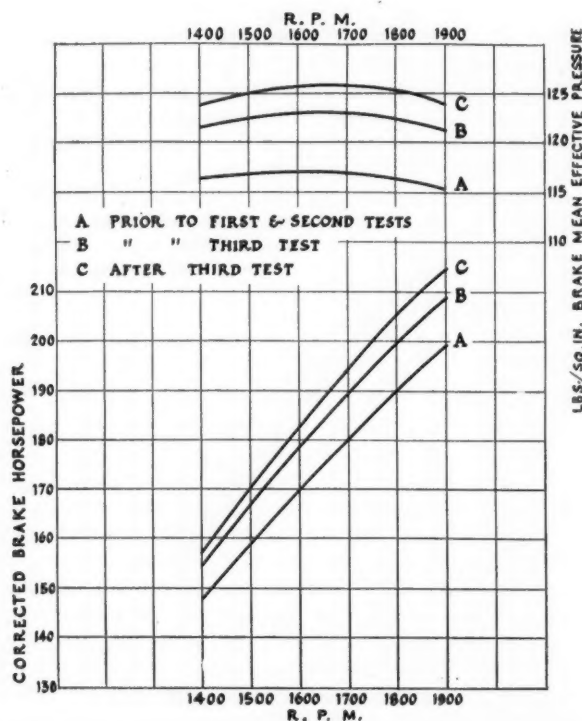
Failures Capable of Quick Repair

All failures which occurred during the entire period of the test, up until the failure of the ball bearing referred to, were of such nature as to be entirely capable of repair by the operating crew without removing the engine from the plane, and without necessity for complete overhaul. The average aircraft engine which has been in use in the Naval Service in the past has required a *complete* tear-down and overhaul every 100 hours or less. The features which were incorporated in the E-2 Wright engine were features which have been developed as the result of extended experiment and development work on a number of different types, for the purpose of increasing the dependability and durability of all service types of engines. Similar features are being or have been incorporated in a number of other types of engines which are now undergoing similar tests to that run with the E-2 Wright engine, and which appear at the present time to be capable of performing with at least equal excellence.

The failures which occurred in connection with this particular test have been made the subject of very careful investigation, and modifications are being adopted in similar parts in all engines, which it is hoped confidently will eliminate similar failures in this and other types of engines in the future.

In January of 1922 the Bureau of Aeronautics selected two aircraft engines to be subjected to endurance tests to determine how long it was possible to operate such engines without major overhaul. The objective was 300 hours. The engines selected were the Aeromarine Model U-8-D, which developed approximately 220 hp. at 1800 r.p.m. and the Wright Model E-2, 8-cylinder engine, which developed approximately 190 hp. at 1800 r.p.m. A description of these first attempts at the 300-hour test has been already published.* Therefore, only a synopsis of these tests will be given.

The engine was operated at approximately 9/10 throttle for a period of 100 hours, using domestic aviation gaso-



Performance curves of the Model E-2 Wright engine, showing effect of improvements in design, etc.

*See article on Powerplant Development in the Navy by Lieut. B. G. Leighton, April, 1923, S.A.E. Journal.

line. At the end of this period all connecting-rod bearings and all valves were in such poor condition that further running was out of the question. The engine was fitted with new bearings and valves and subjected to a second period of 100 hours' operation at approximately 9/10 throttle. At the end of this period the bearings and the valves were again in such poor condition that further running was impossible.

These two runs definitely proved that both the bearings and the valves must be changed either in design or material or both in order to give the required durability.

A new engine similar to the first was then fitted with redesigned valves and bearings and subjected to 25 hours' running at the works of the manufacturer.

It was then delivered to the Naval Air Station, Anacostia, installed on a free-air testing stand equipped with a propeller for absorbing the power, and operated for a period of 125 hours at wide-open throttle. Two stops were made because of the failure of testing equipment, and one stop to replace all spark plugs and one magneto. The spark plugs were of the porcelain type. All electrodes were burned away. The magneto had a broken distributor.

The engine developed during this period approximately 189 hp. at 1770 r.p.m., which corresponds to a b.m.e.p. of 118 lb. per sq. in. Toward the end of the period the power dropped materially. The specific fuel consumption ranged between 0.52 and 0.55 lb. per b.hp.hr.

The engine was dismantled for inspection. Four pistons were cracked, the exhaust valve seats deeply recessed, valves in excellent condition, crankshaft annular ball bearing slightly worn, connecting-rod bearings and all other parts were in excellent condition.

Redesigned pistons and a new annular ball bearing were installed. The valve seats were reamed and the valves refitted. No other adjustments or replacements were made.

Three Stops Made

After assembling the engine, it was returned to the testing stand and operated for another period of 125 hours at wide-open throttle. Three stops were made, two because of failure in testing equipment and one to replace all spark plugs and two magnetos.

During this period the engine developed approximately 186 hp. at 1745 r.p.m., which corresponds to a b.m.e.p. of 118 lb. per sq. in. The power dropped off slightly toward the end of the run. The fuel consumption ranged between 0.52 and 0.55 lb. per b.hp.hr.

The engine was dismantled for inspection and found to be in much the same condition as at the end of the previous 125-hour period, except that the redesigned pistons were in excellent condition. The valves had again recessed into their seats. Bearings, gears and all other parts were still in excellent condition.

The modifications previously made had eliminated the failures of bearings, valves and pistons, but had not corrected valve-seat troubles.

Tests were discontinued temporarily until means could be found for eliminating valve-seat troubles. After some experimentation and independent tests an entirely redesigned cylinder block was developed. The closed end steel cylinder sleeve, in which the valves seat directly on the head of the steel sleeve, was replaced by an open-end sleeve. Aluminum bronze rings to form the valve seats were pressed into the aluminum cylinder head. The redesigned cylinders are shown in the accompanying drawing.*

The insertion of the aluminum bronze rings made it impossible to use valves as large in diameter as originally used and to avoid reducing the volumetric efficiency, the

INCORRECT reports, wrongly attributed to the Bureau of Aeronautics, Navy Department, of a 572-hour non-stop test of the Wright, Model E-2, aircraft engine, have resulted in mistaken impressions which this article seeks to correct.

Some parts of the engine tested ran a total of 572 hours, but the tests were intermittent and extended over a period of some eight months, during which time several parts of the engine and its auxiliaries were replaced and in some cases new parts were designed and substitutes for others which had failed during the tests. After the first 275 hours of testing, a new design of cylinder block was substituted for the old. Stops were made for various causes, many of which had nothing to do with the engine.

lift of the valves was increased by the use of a redesigned camshaft. Two of these new blocks and camshafts were installed on the engine previously tested and test was resumed. No other repairs, adjustments or modifications were made. Bearings, gears and other parts were not refitted.

The engine was operated at 200 hp. for a period of 58 hours on various dynamometer performance tests. With the new cylinder block it was found to develop 200 hp. at 1800 r.p.m. corresponding to a b.m.e.p. of 122 lb. per sq. in. with a special fuel consumption of .52 to .55 lb. per b.hp.hr.

After the preliminary running, the engine was delivered to the Naval Air Station, Anacostia, D. C., mounted on an open air torque stand with a propeller to absorb the power and operated for 252 hours at wide-open throttle under conditions simulating those of the previous endurance test. During this period 15 forced stops were necessitated by the failure of magnetos, magneto drives, spark plugs, ignition cable and valve springs. Ten stops were made for inspections, to replace propellers damaged by heavy rainfall and for holidays.

No valve-spring failures occurred during the previous tests, and it is probable that the increased lift of the valves which was necessitated by the redesign of the cylinder construction caused the fatigue of the valve springs.

The magnetos were of a different type from those used in the previous tests and frequently gave trouble due chiefly to the failure of mechanical parts. Seven magnetos were changed during the last 270 hours.

In the latter period the engine was equipped with one set of porcelain spark plugs and one set of mica plugs. During the run, 7 porcelain plugs failed and were replaced by others. At the end, all electrodes of porcelain plugs were badly burned away. The mica plugs were in excellent condition.*

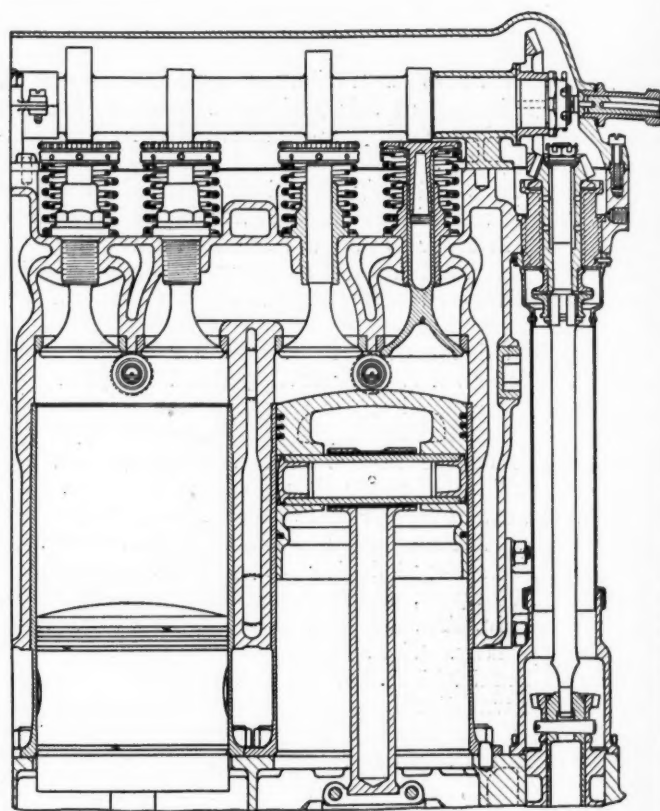
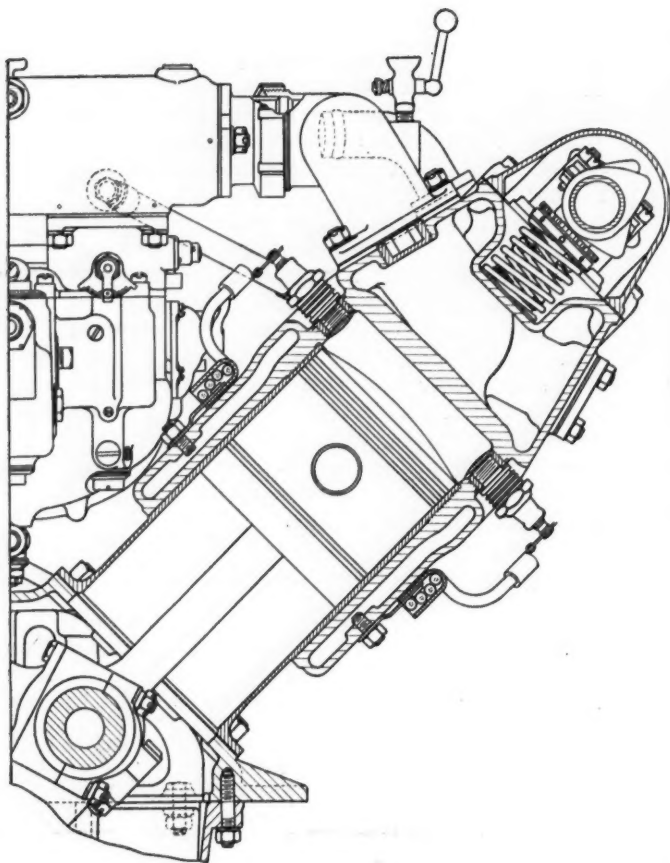
Averaged 200 hp. at 1800 r.p.m.

During the entire period of 270 hours, the horsepower averaged 200 at 1800 r.p.m. corresponding to a b.m.e.p. of 122 lb. per sq. in. The specific fuel consumption ranged between .52 and .55 lb. per b.hp.hr.

It was intended to operate the engine on the torque stand for a period of 300 hours, but at the end of approximately 248 hours, the oil consumption increased to several times its normal value. Investigation at the end of the 252nd hour revealed a broken main bearing bolt and

*This does not indicate that mica plugs are superior as a type to porcelain plugs, but that the mica type tested is more durable than the porcelain type tested.

*A drawing of this engine with closed end sleeve was published on p. 154 of AUTOMOTIVE INDUSTRIES for Jan. 27, 1921.



Sectional view of the latest type cylinder block, used during part of the test. Note open end sleeve with valves seating on aluminum-bronze rings

several broken crankcase studs. These parts had had at this time a total of 572 hours of full throttle running.

The engine was removed from the torque stand, delivered to the laboratory and mounted on an electric dynamometer for a power check run. It was found that the power had not decreased. Actual records showed a horsepower of 205 at the end of the test and 200 at the beginning. The specific fuel consumption ranged between .52 and .55 lb. per b.hp.hr.

Engine Dismantled for Inspection

The engine was completely dismantled for inspection. The crankshaft rear annular ball bearing had failed completely. Two main bearing webs were broken and the gears in the crankcase were badly damaged, probably by the broken parts of the ball bearing which undoubtedly passed between the teeth. The camshaft upper drive shaft gears were in excellent condition. There is little doubt that the failure of the ball bearing was the direct cause of the failure of the main bearing bolt and the crankcase studs which caused the discontinuance of the test.

Connecting-rod upper and lower bearings, pistons, piston rings, cylinders, crankshaft, crankshaft main bearings, valves, valve seats, valve stems, camshaft bearings and camshafts were in excellent condition. The exhaust valve seats and valves were slightly pitted, but, considering the 310 hours of full-throttle operation and the fact that the power at the end of the test was at least as great as at the start of the test, their condition was remarkably good.

Several valve springs were broken. The water-pump shaft squared driving end was rounded off and probably would have failed within a few hours of operation.

Although several forced stops were made during the test, up until the time that the ball bearing failed, no

failures occurred which were of such nature that they could not readily be repaired in normal flight service at a flying field without removing the engine from the airplane. Failures were similar in nature to those which are actually being repaired in service units in every-day operation by the plane crews.

It is worthy of note that approximately one year ago when the Model E-2 engine was considered one of the most durable aircraft engines in service, it was usually found that after a period of 100 hours of operation in flight service, usually at reduced power, complete or partial failure of vital parts, such as bearings and valves, occurred which required complete disassembly and overhaul of the engine. As the result of the development work of the past year, the same type engine has demonstrated its ability to operate at full throttle, at sea level, for a period of 310 hours, developing during this period approximately 40 per cent more power and, except for the failure of the ball bearing, without the failure of any major parts and without any decrease of power.

In this one year of development, the life of the connecting-rod bearings has been increased from less than 100 hours at reduced power, to 572 hours at full throttle. At the end of this period they were apparently in need of no repairs or adjustment. This same type of bearings has been used with excellent success in other models of engines and is being adopted for all aircraft engines in use by the Navy.

Original Valve Equipment Replaced

The valves originally used failed on two occasions in less than 100 hours when the engine was developing a b.m.e.p. of less than 92 lb. per sq. in. As redesigned, the valves have operated for a period of 310 hours at full throttle, with the engine developing a b.m.e.p. of 122 lb.

per sq. in., and at the end of this period are still in excellent condition.

The crankshaft, gears, connecting-rods, accessory drive shafts, thrust bearing, crankshaft main bearings and other vital parts, operated for a total of 572 hours, and at end of period were, with few exceptions, in excellent condition.

The life of the spark plugs has been increased from less than 100 hours to over 300.

Approximately one year ago the Navy Department instituted the policy of developing every service type of engine to the point where it will be capable of full-throttle operation for a period of at least 300 hours without the failure of any major parts, or the necessity for major overhauls for replacements or adjustments. This particular test, and the development work incident thereto, was un-

dertaken as one phase of the larger problems of discovering definitely the cause for engine failures in general, and developing means for eliminating those failures. Similar tests and intensive development work have been in course on all types of engines with generally similar results. At the present time the chief source of difficulty appears to lie in the engine accessories, ignition systems, cooling systems, lubricating systems and the like. The accessories are receiving the greatest attention and very marked improvements are already forthcoming. The lessons learned from tests of one engine are usually applicable to all, and the extremely gratifying results obtained thus far indicate very clearly that it is entirely reasonable to expect that engine failures will become as uncommon as are actual plane structural failures at present.

Trojan Two-Stroke Engine Has Novel Cylinder Arrangement

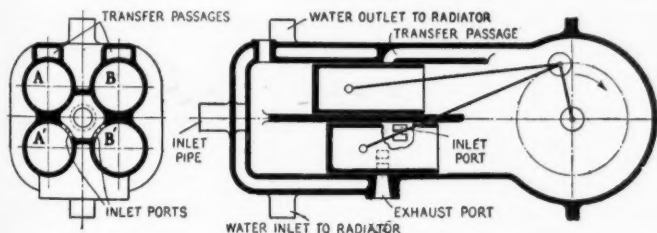
SOME decidedly unconventional designs of cars are being put forward in England to meet the demand for a car of low first cost, low tax rate and economical to operate. Manufacturers are coming to realize that if a light car is made merely a miniature of the standard type of large car, the saving which can be made in the cost of manufacture is not very great, and some radical changes must be made in the design if the production costs are to be cut materially.

Leyland Motors, Ltd., who have long been prominent in the manufacture of motor trucks, and about two years ago came out with a super-luxury all-in-line eight, at the recent London show exhibited the Trojan light car, a design possessing many of the characteristics familiar in this country about fifteen years ago.

The Trojan has a two-stroke engine, a planetary two-speed transmission double chain final drive and solid

a pair of vertically superposed cylinders instead of a larger single one. One advantage claimed for the engine is that there are only seven moving parts, viz., the four pistons, two connecting rods (the connecting rods for each pair of cylinders are evidently made in one), and the crankshaft. Ignition is by battery and coil with a single plug for each pair of cylinders. Lubrication is effected by mixing the lubricating oil with the fuel, the proportion being one volume of oil to 32 of fuel.

To give a cushioning effect to the transmission, the planetary gearset is connected to the flywheel by means of a number of radial springs. The planetary gear gives two forward speeds and reverse. Final drive is by side chains and no differential is used, the car being designed to run on solid rubber tires. Particular attention has been given to the suspension, which consists of long flat cantilever springs. The car weighs 1400 lb. and is geared to run at 20 m.p.h. with an engine speed of 1000 r.p.m. A fuel mileage of 32 to the U. S. gallon is claimed. The accompanying drawings are reproduced from *The Engineer*.



tires. The engine has four cylinders though it presents the appearance of a single cylinder horizontal type. This is due to the fact that one cylinder is located on top of another and there are two of these pairs of cylinders side by side. The two cylinders of each pair have a common combustion chamber and act really as a single cylinder. The pistons in them are both connected to the same crankpin, the crankshaft being a double throw with the two throws at 180 deg. of each other. Evidently in view of the British taxation law, which makes the tax on the car proportional to the square of the cylinder bore, the stroke-bore ratio has been chosen very high, the cylinder dimensions being $2\frac{1}{2}$ by $4\frac{3}{4}$ in.

The engine is of the so-called three port type with crankcase compression. The pistons in the two cylinders of each pair are so arranged that the bottom piston has a certain amount of lead over the top one and uncovers the exhaust port some time before the upper piston uncovers the transfer port. The wall between the two cylinders is presumably quite effective in preventing the loss of fresh charge through the exhaust port, and this would seem to be the only advantage of using

New Lock Serves Triple Purpose

BASED on the assumption that few motorists lock their cars when parking but that they invariably shut off the engine, a lock has been developed which uses the action of throwing off the ignition switch to lock the ignition and the steering post simultaneously. It then requires a key to unlock them.

The Hershey Theft-proof lock, as the new device is called, combines in one assembly a steering column bracket, an ignition switch and steering post lock and is intended to be applied as original factory equipment.

No holes or slots are drilled in the steering post for installation. A collar carries the slot into which the lock plunger fits when in locked position.

This new device has recently been placed on the market by the Hershey Sales Co.



Hershey theftproof lock combines lock, steering column bracket, ignition lock and terminals

Announcement of New Testing Machine Event of Gear Makers' Meeting

Manufacturers learn of device to be built to determine effect of variation in pitch line velocity on strength of gear teeth. General election of officers for first time. Many standardization sub-committees make preliminary report. Little action taken.

By P. M. Heldt

ONE of the most notable events at the seventh annual meeting of the American Gear Manufacturers' Association, held at the Hotel Cleveland, Cleveland, last week, was the presentation of a paper by Wilfred Lewis of Philadelphia on a new gear testing machine by means of which it is believed possible to determine accurately the effect of variations in pitch line velocity on the strength of gear teeth.

Lewis is the author of the formula which has been almost universally used for the calculation of the strength of gears for the past thirty years, and his name therefore is familiar to all gear men. The machine referred to has not yet been built, and a fund is now being raised among firms in the gear industry to defray the cost of construction and of the experimental work for which the machine was designed.

Although numerous reports were made by sub-committees of the general standardization committee, most of the recommendations made were of a preliminary nature and had not yet been placed before the membership at large, as required by the rules of the Association, hence no definite action could be taken on them at the meeting. Only a part of the report of the Bevel and Spiral Gear Sub-Committee was definitely adopted as Recommended Practice by the Association.

New Officers Elected

For the first time in the history of the Association a new set of officers were elected. Former president F. W. Sinram, who has guided the destiny of the Association since its organization in Lakewood, N. J., six years ago, was elected honorary president for life. George L. Markland, Jr., of the Philadelphia Gear Works, was elected president, A. W. Copland, of the Detroit Gear and Machine Co., first vice president; B. F. Waterman, of the Brown & Sharpe Co., second vice president, and C. F. Goedke, of the William Ganschow Co., treasurer. The following were elected directors of the Association: Geo. L. Markland, Jr., B. F. Waterman, and R. P. Johnson for a term of three years; C. B. Hamilton, Jr., for a term of two years and Arthur Parson for a term of one year.

President Sinram in his address said that for the first time in the history of the Association we had before us a period of normal times, nevertheless conditions were more favorable to the natural progress of the Association's aims and purposes than at any time since its inception. One concern was elected to membership in the Association, the Braun Gear Works of Brooklyn, N. Y., while two resignations were accepted, those of the Earl Gear Co. of Philadelphia and the Weeks-Hoffman Co. of Syracuse, N. Y. Several new representatives of companies

already members of the Association were also elected to either executive or associate membership.

B. F. Waterman made reports for both the General Standardization Committee of the Association and of the A. G. M. A. Sectional Committee of the American Engineering Standards Committee. The former report consisted chiefly of a survey of the work in hand by the various sub-committees, while in the latter Waterman reviewed the work done with a view to getting the American Engineering Standards Committee to recognize some of the A. G. M. A. standards and recommended practices as American provisional standards.

Composition Gearing Standard Modified

It had been found that the composition gearing standard was not in suitable shape for adoption as an American standard. It was prepared in the form of charts, and Waterman found that by arranging the material in tabular form it could be made to occupy much less space. The A. G. M. A. recommended practice for gear inspection was found to be not a proper subject for an American standard. One meeting of this sectional committee was held in January and another was scheduled for May 4, and at the latter meeting, Waterman said, he would turn over to the secretary of the committee five recommended practices submitted for adoption as tentative American standards.

At the request of the A. S. M. E. Gear Research Committee two members of the Association (A. W. Miller of the Fellows Gear Shaper Co. and F. A. McMullen of the Gleason Works) were appointed members of that committee. This committee has asked for the raising of a fund of \$7,500 for research work on the strength of gear teeth, in connection with a testing machine described to the meeting at a later session by Wilfred Lewis. A good deal of the money has been pledged already, and there is little doubt that the machine will be constructed and the tests made.

Mid-Season Meeting of Standards Committee

A mid-season meeting of the Standards Committee will be held at the Clifton Hotel, Niagara Falls, Canada, on June 8-9. The plan is that on the first day only the chairmen of the different sub-committees shall be in attendance, while on the second day all members of the Standards Committee shall attend. A similar meeting was held last year, and one of the members of the committee said that more good work was accomplished there than at any other meeting for the reason that the attention of members was not diverted by other events.

The Spur Gear Committee, F. E. Eberhardt, chairman,

presented a formula for the calculation of the strength of spur gears, as follows:

$$Hp. = \frac{\text{Strength} \times \text{Face (inches)} \times \text{Factor } y \times \text{Velocity (ft.p.m.)}}{\text{Diametral pitch} \times 18 \times (\text{Velocity} - 600)}$$

Strength of Materials Factor*

Cast iron	8
Semi steel	9
U. S. Gov't bronze	10
.30 per cent carbon steel	15
.50 per cent carbon steel	25
Rawhide	5
Bakelite, micarta, formica, textoil, etc.....	5

*Note.—This factor is obtained by dividing the ultimate tensile strength of the material by 4000.

Waterman, commenting on the horsepower formula, thought the derivation should be given. He said that in obtaining the strength factor the committee had evidently taken one-half the elastic limit of the materials; it was a more common practice to take two-thirds of the elastic limit. C. B. Hamilton, Jr., said that if one were to apply this rule to non-metallic gear materials one would go far astray, as the valuable property of these materials was their resiliency. Two materials might have the same elastic limit, but their resiliency might vary as 6 to 1. Speaking for the committee, Eberhardt said that the formula really did not introduce any new rule, but combined the four steps usually required to find the strength of a gear wheel, into one, except that the velocity had to be calculated separately. W. H. Phillips of the R. D. Nuttall Co. said the Spur Gear Sub-Committee had gone outside its proper province in giving figures for the strength of the materials used in gear making, as this should be done by the Metallurgical Committee. Asked as to what the Metallurgical Committee was doing along this line, Hamilton said that this subject had been well taken care of by the S.A.E. on whose steel specifications those of the A. G. M. A. are based. W. G. Fisher of the General Electric Co. said that in connection with textoil they always allowed the same strength factor as used for cast iron, and another member pointed out that this would make its factor 8 instead of 5.

Spur Gear Terms Submitted

The Nomenclature Sub-Committee presented a list of terms applying to spur gears. Objection was raised to some of the definitions, and the report was accepted as a progress report only.

The report of the Sprocket Wheel Committee, made by G. M. Bartlett of the Diamond Chain & Mfg. Co., was in two parts. The first part related to a series of chain and sprocket sizes which have already been adopted as standard by the S.A.E. and the A. S. M. E. The second part related to a modification of the standard sprocket tooth form as approved by the Associated Chain and Sprocket Committees in New York on Jan. 8.

In the original design very careful consideration was given to the working arcs of the tooth. The exact height of the tooth was set in an empirical manner, as it was not an important operating element. Subsequent developments indicated that the long tooth restricted the range of teeth that could be covered by a given cutter, whereas it seemed desirable to increase this range for certain special cases. This was accomplished by shortening the tooth and giving greater clearance between the roller and the point of the tooth. Also, the probability of an increased use of hobs and "Fellows" cutters for generating the teeth has increased the desirability of modifying the angle of tooth gap for larger numbers of teeth so as to conform more closely to the generating process, and at the same time to produce a desired increase in pressure angle for

the larger sprockets. This was adopted as a progress report.

A paper entitled "What Does the Microscope Tell Us?" was read by E. C. Smith, chief metallurgist of the Central Steel Co. The paper was illustrated by a large number of lantern slides of microphotographs of various ferrous metals. A considerable portion of the paper was devoted to a description of the constituents of steel and iron in their commercial forms. In another part of the paper the use of the microscope in diagnosing defects in steel was dealt with.

Smith said that one particular gear maker had standardized microphotographs for use in inspecting case-hardening steel. He had prepared a set of microphotographs for nine different case-hardening steels—three photographs for each steel, of the case, the core and the transition zone respectively. He had made a large number of gears from each of these and knew their characteristics as to machinability, hardness, distortion, etc. By comparing the three microphotographs from any new steel with his standard set, he knew exactly what results to expect from the new steel. Smith said that the work of establishing standards of structure was progressing and that at some future date as much attention might be paid to structure as to chemical analyses.

Gear Grinding Advantages

At the evening session on the opening day E. J. Lees of the Lees-Bradner Co. presented a paper on Grinding and Measuring Involute Gear Teeth. The first part of the paper was devoted to a description of the Lees-Bradner gear grinder and to an enumeration of the advantages of gear grinding, particularly in the automotive field.

In the second part Lees described the gear testing device recently developed by his concern. He said that the accuracy obtained in tooth grinding called for a different procedure in testing the teeth, both for profile and spacing, than the familiar methods of rolling the gears together or using spring centers, since it is possible to grind the profile to within 0.0002 in. of a perfect involute. The Lees-Bradner testing device is based on the principle that a point on a string or tape unwound from a base circle concentric with the gear will trace the involute profile of the tooth.

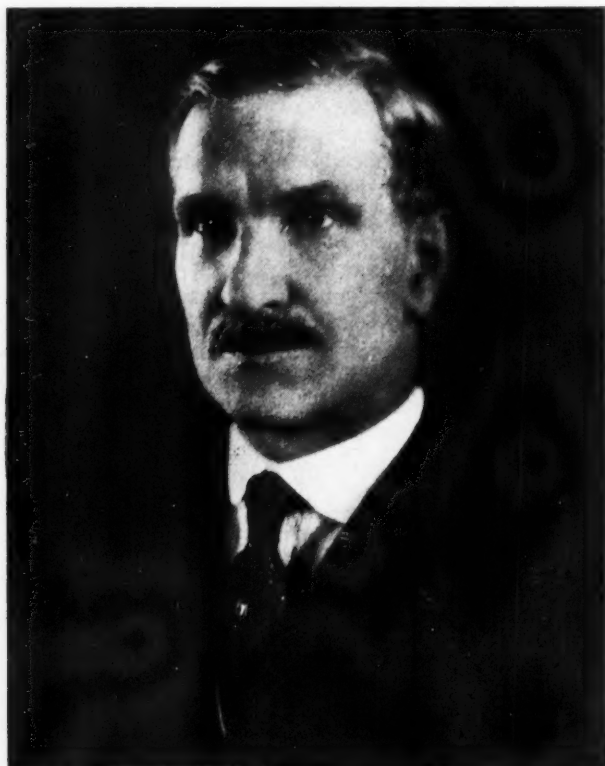
In the gear tester a bar takes the place of the string rolling on the base circle (represented by a disk mounted on the work arbor). It traces a true involute of the gear to be tested. In testing a gear, a contact point is brought against the tooth, and the bar is pressed by a spring against the base circle disk, the frame is then rotated on the gear axis and the profile of the tooth is recorded by a dial indicator reading to 0.0001 in. If the pointer of the dial gage remains in the zero position, the tooth profile is a perfect involute. If the profile is not perfect, the gage gives plus or minus readings of variations from the true involute.

Profile Modified to Suit Local Conditions

Owing to the fact that the gears are not always mounted in perfect alignment in absolutely rigid supports, it is sometimes found that the profile has to be modified to suit local conditions and tooth loads. When modified gears are necessary to meet such conditions a record may be kept and all gears of the particular size ground accordingly. Another method consists in keeping a master gear which has been proven to run quietly by tests and then, when grinding, first use this master on the testing device, observing the reading or the curve, and grinding to produce the same reading or curve. According to tests made so far, very little modification is needed in well machined automobile transmission gears having parallel shafts.

Lees also described how modifications in the tooth profile

are obtained when using his grinder. He also explained the use of his testing device for testing the accuracy of indexing of gear wheels. To this end the gear to be tested is mounted loosely on the arbor of the tester, one tooth being brought up against a fixed stop and the indicator lever against the next tooth. By moving the gear around the arbor, one tooth at a time, any errors in indexing are indicated to 0.0001 in.



George L. Markland, new president of the American Gear Manufacturers' Association

In the discussion the claim was made by Lees that ground gears are no more expensive than those finished in the ordinary way. The reason for this is that when gears are to be ground they can be roughed out in a rather rough and rapid way, and the finishing operation in the gear cutter is dispensed with. In answer to a question he said that usually from 2 to 7 gears are finished to one dressing of the grinding wheel. Usually the gears are finished by the single cycle method, that is, the grinding wheel is passed over the surface twice. Some customers use the two cycle method, which gives a little better finish but no greater accuracy.

One of the drawings projected on the screen in connection with Lees' paper showed four gear wheels meshing together, with different pressure angles but all finished with the same setting of the grinding wheel. Glenn Muffly, who is connected with the Lees-Bradner Co., in this connection exhibited a model to bring out the fact that with any base circle there is only one involute curve, and the pressure angle of the tooth of which this curve forms the flank depends upon what portion of the involute is used.

The model consisted of two wooden disks capable of being revolved around studs in a base plate, of which studs one was movable so as to make it possible to vary the center distance. A steel tape passing over the circumferences of the two disks and carrying a pencil described an involute curve, and the pressure angle at the pitch line was shown to vary with the distance apart of the two disks. Muffly said that in gear cutting

practice we are getting back to fundamentals. When using a rotary cutter the same cutter can be used only for a given pressure angle and a limited number of teeth. When using a generating cutter of the multiple tooth type we are still limited to one particular pressure angle, but can cut gears with any number of teeth, whereas when using a straight edged or rack-form of tool we can cut gears with any number of teeth and any pressure angle.

At the Friday morning session C. B. Hamilton, Jr., presented the report of the Metallurgical Committee. He said nothing was done in the matter of steel casting specifications during the past half year, as proper support could not be had from other interested societies. The point was that the steel foundries were not furnishing the grade of material desired, and did not normalize or anneal their castings properly. Of course, it costs less to bring the castings up to an annealing temperature of 1400 deg., than to raise them to 1900 deg. and it costs less to heat them $\frac{1}{2}$ hr. than to heat them 6 hr.

More Than One Carbon Range Necessary

The matter of carbon content in steel castings will also come up, and it is pretty well established that there ought to be more than one carbon range. The foundries don't want the carbon specified, and want the specifications limited to the tensile strength. This would be all right so far as strength is concerned, but does not insure durability. The committee will also go into the matter of hardness testing and will establish limits of hardness for bars, forgings, etc. Hamilton read a paper on the Spark Test for Steel, prepared by Stanley P. Rockwell, metallurgical engineer, and after the reading Rockwell gave demonstrations of the method.

It was announced that at the next meeting of the association the Committee will present a paper on furnace design. The part on oil furnaces was ready in time for presentation at this meeting but the preparation of the part on electric furnaces was delayed by illness of the author thereof. In the past, Hamilton said, the electric furnace had been too much of a proprietary article and gear makers could not build such furnaces themselves, but this state of affairs was now changing.

F. E. McMullen next presented the report of the Bevel and Spiral Bevel Gear Committee. This contained tables and text matter concerning the Gleason Works system of bevel gearing, which subject was dealt with in a preliminary way at the Chicago meeting last fall. The tables, etc., were printed in *AUTOMOTIVE INDUSTRIES* of Oct. 19, 1922.

Bevel Gearing System Adopted

Before any action was taken on the report, discussion was called for. S. O. White of the Warner Gear Co. said that they had been using the system, but only for a small number of mean ratios. As far as their experience had gone they had had no trouble and the system seemed to work out very well. Others who had had experience with the system also spoke favorably of it and this part of the report was adopted as recommended practice for future design. That part of the report dealing with bevel gear nomenclature was adopted as a progress report.

F. S. Sorensen made a report for the Composition Gearing Committee. The latter had worked its composition gearing standard over in accordance with the recommendation of Chairman Waterman, putting it in tabular instead of charted form. It was accepted as a progress report.

It was at the Friday morning meeting that Wilfred Lewis presented his paper on "A Gear Testing Machine," to which reference has been made already. This was a lengthy paper and accompanied by quite a number of illustrations. We expect to print this paper in an early issue. Owing to limitations of time there was no discussion on the paper. On Friday afternoon the visitors were taken to points of interest in Cleveland by automobiles furnished by the Cleveland members. In connection with this excursion invitations to visit their plants were issued by five local machine tool makers. On Friday evening there was an informal banquet at which President Sinram acted as toastmaster. One of the speakers, Col. L. P. Ayres, vice-president of the Cleveland Trust Co., whose subject was "How Long Will Prosperity Last?", referred particularly to conditions in the automobile industry.

At the Saturday morning session several more committee reports were made, including that of the Industrial Relations Committee. Reference was made in this report to the labor shortage experienced in different sections and to arrangements made by different manufacturers with high schools and manual training schools whereby the manufacturers agree to take the students into their plants during part of the student's time and pay him for his time.

The Remy Electric Co. of Anderson, Ind., for instance, has made such an offer to the local high school, agreeing to take students who have finished two years of high school work. The member presenting the report said that immediately it became known the Remy company had made such an agreement, all other manufacturers in town began to wonder where they were going to get their boys from. B. F. Waterman said that in Providence they took boys after one year's high-schooling into the shop, the boy then spending one week in school and one week in the shop. Allen of the Brown-Lipe Gear Co. said they had established a school at the plant in which they taught such subjects as shop arithmetic, the reading of blue prints, etc.

Work of Inspection Committee

J. E. Frost, of the Frost Gear and Machine Co., spoke of the work of the Inspection Committee of which he is a member. He said that the only two remaining subjects for that committee to consider were inspection methods for raw materials and the determination of gear noises. The former subject had been taken up with the Metallurgical Committee and the latter was in the hands of the Executive Committee. A member suggested that the matter of the determination of gear noises be taken up with Hiram Percy Maxim who had done valuable work along this line. H. E. Eberhardt said that, in observing cars on the road while being driven on high gear, he had seldom been able to note any gear noises, but the noise made by the tires was always very pronounced.

K. L. Hermann of The Studebaker Corp. gave a talk on Tooth Forms of Automobile Gears after Cutting, Hardening and Grinding. Hermann has developed a device, based on the use of dial indicators, for determining the errors of profile and indexing in gear wheels. A description of this device was given in a paper presented to the S. A. E. Production Meeting at Detroit last fall. With this device numerous tests have been made since, and the curves of profile and indexing errors thus obtained were projected on the screen and commented on. We expect to reproduce some of these curves in an early issue.

On the motion of C. B. Hamilton, Jr., Stanley P. Rockwell, who has presented a number of valuable papers to

the association, was appointed metallurgist to the association without any obligation on the part of the members to avail themselves of his services.

The afternoon session on Saturday was given over to commercial problems. Owen A. Locke, treasurer of the Tillotson Wolcott Co., investment bankers, gave Some Thoughts of an Investment Banker on the Gear Business. He reviewed the situation of the automobile market and said that in view of the fact that it was generally agreed that the present productive capacity of the automobile industry was greater than the absorbing capacity of the market over a period of several years, he would not advise any gear maker catering to the automotive industry to greatly increase his fixed assets at this time. He said that the automobile industry was in the habit of planning long in advance, and long commitments increased credit risks.

Uniform Cost System to Be Pushed

E. A. Kebler presented the report of the Commercial Standardization Committee and J. H. Dunn that of the Uniform Cost Accounting Committee. These were mainly in the nature of reviews of what has been done in the past and contained no definite proposals. Dunn complained that in spite of the fact that the committee



Former president F. W. Sinram elected honorary president for life

had worked out a uniform system it had not been put into effect by any considerable number of member companies, and he suggested that a new committee be appointed, comprising the executive officers of the association, who undoubtedly would have more influence in inducing the member companies to adopt the system. He was assured that the executive committee would take the suggestion under consideration. Kebler thought that in dealing further with the uniform cost accounting problem, attention should be confined for the time being to the problem of the most equitable distribution of overhead expense.

Two papers were presented during the afternoon, one

by O. C. Kiehne of the Van Dorn Electric Tool Co., on Practical Value of Cost Accounting, and the other by A. F. Cooke of the Fawkus Machine Co. on Hit and Miss Cost Accounting. Both these papers and the two committee reports referred to above were discussed together.

It was announced that the fall meeting of the association would probably be held at Lake Mohonk, where the association met two years ago.

Stanley P. Rockwell, metallurgical engineer, delivered a very interesting paper on the determination of the grade of steel by observation of the characteristics of the spark when the sample is held against an abrasive wheel. The paper follows:

Art of Determining Grade of Steel by Spark Observation Now Brought Down to Practical Working Basis

DETERMINATION of the grade of steel by observation of the characteristics of the spark when the sample is held against an abrasive wheel has long been practiced by tool makers and hardeners. Charts have been prepared showing the appearance of high, low and medium carbon steels, and steels containing chromium, tungsten, manganese, etc.

Only in the last two years has the art been brought down to a practical working basis so that it may be used for all inspection of steel.

Mr. Starkey of Hartford, Conn., has been instrumental in developing the method for factory inspection. He recently gave up his position with the Whitney Mfg. Co. to introduce the method in other factories. As with all new things of this sort, success depends on one's faith in the method and one's ability to concentrate. Anyone who is mentally alert and conscientious, has good eyesight and is not color blind, may become proficient in its application.

You may have heard claims that one may simply spark a piece of steel and immediately determine the carbon. This is rarely so. It is doubtful if one could estimate the carbon within 10 points unless one had standardized on grinding wheel speed, type and grade of wheel, and had analyzed steel standards from the same heat as the unknown.

Close Estimate of Carbon Content

Under these conditions one may estimate carbon to within 2 points for the lower carbon steels and to within 5 points for the higher carbon steels with surety. With alloy steels the carbon contents may also be determined as closely as for the straight carbon steels, unless the alloying elements are very high, as in high speed steel. The element chromium can readily be picked out in ranges of 0.30 per cent. Nickel below 1.5 per cent is as yet somewhat difficult to determine; though a 1.5 per cent and 3.5 per cent nickel steel are readily distinguished. With tungsten one may readily estimate minute traces and distinguish between 2 per cent, 5 per cent and 8 per cent or more, including the two grades of high speed steel.

Nickel chromium steels may be sorted as closely as S. A. E. specifications. For the beginner it is well to become accustomed to the carbon steels first. After one has become thoroughly conversant with these steels tests of the other steels will be easier.

In looking at the spark produced from steel by an abrasive wheel we see a series of streaks and explosions. If we analyze a single streak from a medium carbon steel we find that we have a "carrier line," a carbon

explosion or crow's foot, an iron burning flash or bird's tongue, and a gas streak. As the carbon content increases:

- 1—The carrier line becomes shorter before the carbon explosion commences.
- 2—The carbon explosion begins to break forth.
- 3—The iron burning flash becomes reduced in length and thickness.
- 4—The gas streak diminishes to nothing.
- 5—The texture of all lines becomes more delicate.
- 6—The carbon explosion adheres to the abrasive wheel.

With chromium steels the carbon explosion is of different appearance than with carbon steels. Each fork of the explosion again breaks into another fork, and these explosion lines also curl. The appearance is somewhat that of a daisy. The iron burning lines are much shorter and a little darker in color. We give them the name of "bee stings."

With high tungsten steels the carbon explosion is absent. The color of the burning lines is dark red ("adder tongues"). As the tungsten decreases carbon explosions appear, with the characteristic form of a daisy, which is associated with chromium content.

Manganese steels cause the carbon explosions to become bushy, somewhat like the bloom of wheat. In sparking the samples the edge of the wheel is not used. It is found more satisfactory to use the surface about $\frac{1}{4}$ to $\frac{1}{2}$ in. from the periphery.

Black Background Used

No obstructions are placed in front of the shower of sparks, as it is often easier to study the characteristics at a distance from the wheel, where the carrier lines are more separated. A black background is used, the usual way being to set the wheel in a black painted cabinet. The color and characteristics of the stream of sparks are the more readily studied. The length of the stream of sparks is not a factor in the determination, as it depends on the size of the test piece and the operator's particular method.

The only difference between hardened and annealed work is that more pressure is required for the same length of spark stream with annealed work. If the steel is carburized or decarburized care must be taken that the surface layer is either ground off or that allowance is made for it.

In determining an unknown, estimate roughly the carbon content from the characteristics shown. If it is, say about 0.20 per cent C., secure analyzed standards of 0.10 and 0.30 per cent carbon. If it then lies between them and nearer the 0.30 per cent standard, select a 0.20 per cent and a 0.25 per cent standard and make new comparative tests.

Standards of Same Heat Necessary

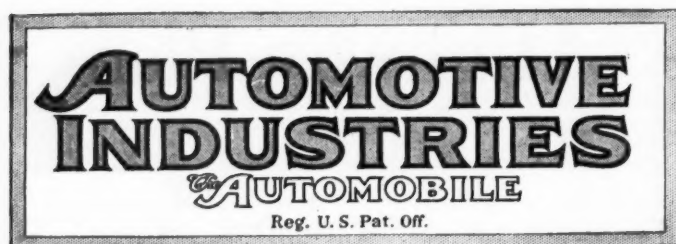
For accurate work standards of the same heat are necessary. For rough determinations within safe heat-treating ranges standards of the same type of steel are satisfactory. Such standards should always be kept on hand, in steps of 0.05 per cent carbon content.

When a new lot of steel is received, select a half dozen bars, spark them, and pick out the lowest and the highest carbons. Have them analyzed, stamp the analysis on the bar and use them as your standards.

Never have a piece of steel chemically analyzed without saving a piece of it with the analysis stamped on it. You never know when it will come in handy. The material inspector working with reliable, analyzed standards can usually make a "100 per cent" inspection.

San Diego County adopts new method of paying for road building. Funds obtained from automobile tax and slight increase in property tax rate. Construction figured at \$25,000 a mile, paid as completed. Adequate sum reserved for maintenance.

By extending this system in units of say, ten years, and by making contracts at the beginning for the entire construction, the direct tax would be reduced still further, and the increase in the rate correspondingly cut down.



PUBLISHED WEEKLY

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Vol. XLVIII

Thursday, April 26, 1923

No. 17

THE CLASS JOURNAL COMPANY

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Owned by United Publishers Corporation, Address 239 West 39th St., New York; H. M. Swetland, President; Charles G. Phillips, Vice-President; A. C. Pearson, Treasurer; Fritz J. Frank, Secretary.
Entered as second-class matter Jan. 2, 1903, at the post-office at New York, New York, under the Act of March 3, 1879.

Member of Associated Business Papers, Inc.
Member of the Audit Bureau of Circulations.
Automotive Industries—The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly) July, 1907.

Why Paint Them Black?

THE chief reason we can recall hearing for painting passenger cars black is that it's cheaper, which is reason enough in some cases at least. When enamels are used, higher baking temperatures are possible with black than with other colors and this in turn gives greater durability. This is another point in favor of black,

The color of a car, however, naturally makes a good bit of difference in its salability. It is next to impossible to please all tastes unless a wide selection of colors is offered, but it does not follow that black is the best compromise. In France they call American automobiles funeral cars because so many of them are black.

Black and other dark colors show dust and dirt more than many lighter colors, and for this reason the latter are to be preferred in the case of the great majority of cars which are cared for by their owners.

The color most readily applied by the factory is not necessarily best from a marketing standpoint or for the user. The matter is not an easy one to decide, but it is worth more study than it often receives. Laboratories might develop other colors which can compete with black in cheapness and durability and thus decrease sales resistance.

Arbitrary Restrictions Dangerous

MUNICIPALITIES are treading on dangerous ground when they attempt to limit arbitrarily the number of vehicles that shall be permitted to operate within the boundaries of any given city. Such an attempt is contemplated in the report made last week by the Mayor's Committee on Survey of Licensing and Traffic in New York City. The report proposes to limit the number of taxicabs in New York to 12,000. About 15,000 are now in operation.

The committee bases its recommendation on the fact that stands are provided for only 1500 cabs, and that the tremendous number of cruising taxis are a serious menace to traffic.

No permanent pedestrian who has ever lived in New York can fail to react favorably, for the moment, to any proposal which seems likely to make it easier for him to get across the street without having to make a 10-yd. run through an open field of charging taxis. Yet there are more important basic factors involved in any such law than those which appear upon first consideration.

Taxicabs can exist only through rendering a needed transportation service to the public. If 15,000 cabs can operate profitably in New York, that fact in itself is proof of a need for that much individual transportation. Otherwise, competition would automatically lower the number within a reasonable time.

Moreover, the present study of traffic regulation and possibilities is far from having reached any point of scientific accuracy. Consequently, any rules set up as to the number of vehicles of a given type that shall be allowed to operate must be entirely arbitrary and are likely to be unfair to the taxicab-using public as well as to those desiring to operate motor vehicles for profit.

A Ghoulish Press Agent

AN AMERICAN press agent, with a working knowledge of "human interest", seizes the gruesome search for the Russian crown jewels in the grave of a humble sailor in a Brooklyn cemetery as the text for a story on the All Russian Agricultural Exposition in Moscow from Aug. 15 to Oct. 15. He finds the "tie-up" in the statement that "Russia's jewels are deposited elsewhere than in cemeteries."

The story then goes on to say that one of the features of the show will be an international tractor exhibition for which displays from the United States are particularly desired. It adds that the more prominent manufacturers in Great Britain, the Scandinavian countries and Germany have applied for space.

The publicity man asserts that Russia placed orders the first two months of this year for \$1,000,000 worth of tractors and plows "with more orders in sight." He probably got his figures confused with the value of the crown jewels for the implement industry exported to Russia in all of 1922 only \$203,000 worth of merchandise. How much more was handled through intermediaries in other European countries and thus does not appear in the American export statistics cannot be determined, but the amount probably was not large.

Ultimately there will be a big market for tractors in Russia and it probably would do American manufacturers no harm to display their wares at Moscow, but they should have no illusions about sales on a large scale in the land of the Soviets.

Offsetting Labor Shortage

AUTOMOTIVE manufacturers have faced the facts of the current labor shortage with clarity of vision. When some other industries shouted for a complete let down of immigration bars as soon as temporary lack of man-power became apparent, automotive interests in general went to work to increase the output per worker. Without seeking Government assistance, they turned out the greatest number of motor vehicles ever produced within a given time, despite labor shortage and transportation difficulties.

The immigration question is too complex and its solution too important to permit its being solved in an offhand manner. Radical changes on short notice are undesirable. Changes which might be favorable to immediate industrial needs might bring about highly undesirable conditions if a slump in business took place. Immigration must be viewed over a period of years. The effect on future unemployment of a greatly increased number of immigrants must be considered in establishing a permanent policy.

Production has to go on in the meantime. A strong demand for automotive products must be supplied. It is more practical to increase efficiency, get better cooperation from employees already available, train more skilled mechanics and shift workers in accordance with seasonal variations in different industries than to sit back and hope for changes in the immigration law.

Help the Production Manager

THE production manager is held responsible for efficiency and cost of production. It is his business to manufacture a certain quantity of parts and vehicles of a given quality for the lowest cost.

But even a perfect production manager must have favorable conditions under which to work. The general executive, the sales manager and the designing engineer are all responsible for providing those conditions. Any one of the three can make efficient production impossible, and any one can increase production efficiency very materially.

Suppose the president of a car manufacturing company makes a trip through the country and comes home extremely enthusiastic about sales prospects. He orders an immediate production increase of 25 per cent. His order may involve purchase of new machinery, realignment of equipment already in operation and a readjustment of working forces. There is no time to analyze all the phases of tool value before purchasing. Immediate action is necessary on the basis of the best information already available. Unit cost of the product may be temporarily reduced by increased quantity, but production efficiency for twelve months may be lowered.

Sudden demands for more production are undoubtedly justified in some cases, but when they are made the necessarily increased production expense should be considered.

The sales manager is responsible for setting dealer quotas and for planning probable sales for some months ahead. If his estimates are accurate and correct in general, manufacturing schedules can be made quite efficiently. Production managers, in general, state, however, that they do not dare to base production plans on estimates made by their sales departments when it actually comes to spending money for equipment.

Detailed and scientific market analysis is one of the greatest aids to production efficiency available.

Selling a Service

MANUFACTURERS selling commercial vehicles are rapidly coming to the conclusion that the best basis for a successful sales talk is a thorough knowledge of the conditions under which their vehicles are to operate. Emphasis of marketing effort is being shifted from the vehicle itself to the things that it will do.

The prospective truck buyer is interested chiefly in how much money he can save by using a truck instead of horses. He doesn't care a whole lot about the front axle *per se*. The railroads want to know if they can turn a deficit into a profit by substituting a railcar installation for present steam equipment in certain cases. The bus operator has his eye on many factors outside the bus itself when he contemplates starting a transportation service.

Builders of commercial vehicles have sensed this trend. The automotive engineers are holding their first transportation meeting this week. The N. A. C. C. recently made a survey of operating experiences with railcar equipment. One small truck company is trying to meet the competition of its big rivals by finding out all there is to know about truck operation in a few specific industries and by concentrating its sales efforts in those fields. Special traffic studies are being used in determining taxicab design. Other examples might be cited.

Successful commercial vehicle selling rests upon different bases than successful passenger car selling. This fact has not been fully recognized in the past. In the future it will be a determining factor in shaping sales methods and practice in all fields.

Tire Companies Reduce Schedules

Demand for Product Begins to Diminish

Makers Have Built Up Finished Goods Inventories So Surplus Again Exists

AKRON, April 24—That tire companies again have overproduced and have built up an abnormal surplus of tires and that the demand for tires is beginning slowly to diminish is indicated by the fact that several of the major tire companies in the Akron district already are beginning to lay off a few men at a time and are gradually and quietly lowering their daily production tickets.

Records of past years show that the tire industry can usually expect a seasonal slump in sales about May or June, or more often in July and August, but this year the spring customer demand for tires has been so unprecedented that manufacturers have claimed a slump period was highly improbable and production has been pushed to the limit in anticipation of a steady demand for tires throughout the summer months.

Factory Facilities Strained

Just as during the short lived era of prosperity in the tire industry in the early part of 1920, manufacturers this year have strained their factory forces so as to gain a maximum tire production and have built up finished goods inventories to a point where a surplus of tires again exists.

Should there be any sharp falling off in tire sales within the next eight weeks, it is stated, several of the larger Akron companies will be forced to pare their factory forces almost in two, for they already have such surpluses of tires on hand that the oversupply will last through even a sales slump of some months duration.

A few of the Akron companies at the beginning of the year promised to profit by past lessons and announced that they would attempt to stabilize production and do away with the seasonal production fluctuations. They intended doing this by producing on more or less of an even keel, keeping production at a steady gait and building enough tires during dull seasons to take care of heavier sales demands in rush periods.

However, few if any of them, have stuck to such a program and most of them are pursuing a "hand to mouth" policy, letting production fluctuate com-

Business in Brief

NEW YORK, April 26—Industry is proceeding at a fast pace, but with some contrasts in the degree of activity of different lines. Iron and steel manufacture and cotton and woolen production continue at record-breaking rate. Building activity in some quarters shows very slight indication of slackening.

Retailers and jobbers are experiencing good business, but wholesalers are finding trade a little quieter. The retail trade expects a steady gain in demand for goods because of general employment conditions, with widespread wage advances in many industrial lines.

The agricultural season is from two to three weeks late throughout the country. Little seeding of spring wheat has been possible, and much acreage of winter wheat is expected to be abandoned due to severe drought. Grain prices have advanced to the highest point of the season.

Car loadings for the week ending April 7 aggregated 895,767 cars, which is a decrease of 42,958 cars from the previous week. Loadings, however, are at a very high point.

Labor continues scarce in all industry, and high wages tend to draw labor away from the farms. Wage advances continue to be made and cover a much greater variety of enterprises. Agitation for change in immigration restriction continues.

The stock market ruled rather quiet last week. Fluctuations covered rather a narrow range. Notable advances were made in some dividend-paying rails. The bond market remained firm.

mensurate with actual sales. Within the past six weeks all rubber companies have broken 1920 peak production records, and have manufactured more tires than were being sold.

With such a situation prevailing any diminishing of tire sales is bound to cause a serious slump, it is believed by some. It is just such a situation that added seriousness to the 1920 slump for the tire companies had such a surplus of tires that it took a year to absorb the surpluses before production could again spurt.

Automotive Plants Evidence No Let-Up

Programs Being Followed This Month May Bring Output Above March Total

NEW YORK, April 23.—At the present rate of production, the March record of 346,000 cars and trucks may be exceeded in April, despite the fact that this is a short working month. The increase in factory schedule is apparent principally among the smaller producers, the major plants having traveled along at relatively top-notch speed for some weeks, being limited in their operations to a certain extent by a shortage of labor and difficulty in getting an adequate supply of material.

Reports for the first ten days of this month indicate that the output of the automobile industry as a whole has increased in volume over the similar period in March. Last month, however, was slow in getting under way and made gradual gains in production as it progressed.

May Reach 350,000 Figure

Should April output reach the 350,000 mark, as is estimated from the pace now being maintained, it would exceed all early predictions and prove one of the surprises of a year marked by exceptionally high monthly records. It would usher in a quarter that, if it maintains production at the same pace, would establish a record far ahead of the 862,872 cars and trucks produced in the first three months of this year.

Ford's operations are now definitely placed on a 6000 cars a day basis with output as a rule running above that figure. Orders are behind with this company as with other major car manufacturers.

The maintenance of high schedules is warranted by sustained demand in the field where cars have been selling well and by an expansion of sales efforts in sections that have been waiting for better seasonal conditions before entering the market. The South continues to be encouragingly productive in the number of buyers and the interest throughout agricultural districts in the West is steadily on the increase. Improved conditions with

(Continued on page 950)

Citroen to Establish Factory Here

May Turn Out Cars Some Time This Fall

Plant Will Be Located Near New
York City, Possibly at
Camden, N. J.

NEW YORK, April 25—André Citroen has gone back to France after three weeks in this country in which time he met prominent financiers and discussed plans for establishing in this country a factory for the manufacture of Citroen cars; visited Detroit, Cleveland and other automobile producing centers; met Henry Ford at Detroit; ran down to Washington and discussed the labor situation with Samuel Gompers and finally placed orders for \$2,000,000 worth of American made machinery for his French factory, taking back with him an engineer from each of the five companies from which he made purchases.

That he will establish an American factory for the manufacture of the full line of Citroen cars seemed an assured fact when he sailed for France today and it is almost certain that when he returns within ten weeks his plans will be completed. Those settled, he will endeavor to begin operations at once, with the idea of bringing out his first American built Citroens by fall and be ready for 1924.

Announcement Follows Dinner

Citroen's financial negotiations have been with the American International Corp., the \$50,000,000 organization of which F. A. Vanderlip is chairman of the board, and the executives of which held a banquet in honor of Citroen following his return from Detroit. After the dinner it was stated that a Citroen factory in this country is a certainty and it was said that it would be near New York City.

This statement makes it seem possible that the plant will be at Camden, N. J., where the New York Shipbuilding Corp., a subsidiary of the American International Corp., is located. It is known that for some time the latter has been working on plans for the building of motor buses in the Camden plant and it is thought that possibly Citroen could be accommodated as well.

While here Citroen visited Detroit, Flint, Toledo, Cleveland and Washington and on this swing around the circle inspected the Ford, Dodge Brothers, Buick, Chevrolet, Overland, Hupmobile and Cadillac plants.

Truck Production Should Be Conservative and Follow Safe Business Expansion Channels

By FRANK W. WARRINGTON,
Sales Manager of the Denby Motor Truck Corp.

Detroit, April 25.

WHAT the motor truck industry needs more than anything else at this time is a large investment in propaganda urging present owners to run their trucks until they are worn out. The worst harm that can come to the truck branch of the industry is to slip into the trade-in method of making sales with all the grief that accompanies it.

Unlike the passenger car field, the truck industry has still a tremendously unexplored sales field, so much so that it may easily be said to be still in its infancy. Undoubtedly a large part of present day truck business is replacement but there is such a large field for new business that replacements should form the minority part for a long time.

The biggest difficulty in keeping the truck business developing along conservative lines will come through the tendency of manufacturers to let production run wild, rather than confining it to safe business expansion channels. Under this system there is certain to be an unsound sales policy wherein competition for business will result in cultivation of trading-in on a basis unfavorable to the dealer and with resulting harmful effects to the manufacturer.

As long as there are many companies manufacturing trucks there will always be competition for business but there is no reason why this should be permitted to result in over allowance on replacements, nor in the encouragement of truck owners to turn in their vehicles before their utility is exhausted.

Development of the truck business from this time on will, in my opinion, witness merchandising entirely apart from passenger car selling. The experience of the past has shown that dealers handling both classes of vehicles have neglected either one or the other, usually the truck. Specialized sales efforts are required for each class.

As a general rule the truck distributor in the large centers will pass out of the picture in my opinion, and sales will be direct from the factory through the retailer, who will receive the maximum commission. This will give him an opportunity to make more money on his sales and also will afford a certain amount of leeway in the handling of sales involving used vehicles.

The passing of the distributor will in many cases require the establishment of branches in the larger centers, but this can be managed very economically. Branches as a general rule are expensive investments but there is no reason for this being so. Cost of service departments have made branches costly but branch service departments, I believe, should be mainly places where complete supplies of parts are kept rather than places where repairs are made.

There is no doubt but that good days are ahead for the truck industry. All parts of the country show a healthy demand, except perhaps in the middle west farm districts which have been slow in recovering from the depression of the past few years.

He also placed orders for new machinery to be sent to France with the Erie Foundry Co., the Toledo Machine & Tool Co., Young Bros., The Palmer-Bee Co. and the Lane Co. This machinery will be installed by Jan. 1, he expects, which will permit him to increase his production from 125 to 250 cars a day, with the hope of reaching 500.

Citroen's talk with Gompers in Washington was followed by the announcement of his adoption of a new wage basis to be adopted in the proposed American factory. This new plan provides for a definite weekly wage which will include all of the bonuses and other items of extra pay which now go to workers employed in big industrial

establishments. It will differ from the prevailing American practice in that the basis for fixing wages will not be so much an hour with extra pay for overtime, but a straight weekly pay basis which will include all of these additional items.

The bonus system which Citroen plans to do away with entirely will be supplanted by increases in the weekly wage of the workers.

Citroen Visits Toledo

TOLEDO, April 23—André Citroen and his party were guests of John N. Willys, president of the Willys-Overland Co., and Gordon Mather, president of the Mather Spring Co., while they were in this city last week.

Strattan Completing Staff Organization

Has Plans for Expanding Distributing Force—Few Changes in Monroe

INDIANAPOLIS, April 20—The Strattan Motors Corp., which now manufactures the Monroe and shortly is to produce the Strattan, is rapidly completing its organization staff and planning for considerable expansion of its distributing force and organization. A corps of district representatives is being built up, and the company expects ultimately to have at least twenty men in the field supervising sales work under the leadership of President Frank S. Strattan, who will handle all sales affairs.

Frederic R. Barrows, vice-president, will act virtually as controller, with Frank E. Kateley, secretary-treasurer, as manager, and Col. Charles F. Warfel as purchasing agent and traffic manager. Berley K. Orr is auditor. Both Strattan and Kateley, formerly of Cleveland, have taken up their permanent residence in Indianapolis.

Except for minor changes in equipment and fittings the Monroe is being continued as it was when taken over by the company. A new type of starter of the same make as formerly used is being employed as are other refined types of equipment and fittings that continue in general design, but with such improvements as are available at this time.

Minor Refinements in Car

Additional color options are to be provided for Monroe cars which formerly were restricted in this particular. Improved head-lights and other minor refinements, such as tire carriers of a new type, are being provided.

The company believes that the Monroe phaeton at \$965, with the sedan at \$1,465 and the coach job, which is expected to be ready shortly at about \$1,095, will prove an attractive line in connection with the Strattan phaeton, which will list at \$695, with the sedan at \$995.

Production of Strattan is expected to begin about the middle of June, even if the early assembly has to be conducted in temporary quarters. The concern is not yet ready to announce its plans regarding the plant it will purchase for the Strattan, but it is understood that several locations in Indianapolis are under advisement.

Final Payment on Small Claims

INDIANAPOLIS, April 20—Final payment of 2.32 cents on the dollar will be made creditors of the defunct William Small Co., former manufacturer of the Monroe automobile, as announced by Judge Sidney S. Miller following a final report of Receiver J. W. Fesler. This will make a total of about fourteen cents on the dollar that the creditors obtain on their claims.

When the company went into receivership in 1920, there was more than \$1,000,000 in claims filed against it. The Monroe car and plant was later sold by the receiver to a new company that operated it under the name of the Monroe Automobile Co., which was recently taken over by Strattan Motors Corp. The latter will continue the manufacture of the Monroe as the Monroe division of the Strattan Motor Corp.

Oshkosh May Issue Bonds to Retire Debt on Plant

OSHKOSH, WIS., April 23—Final action on plans for the reorganization of the Oshkosh Motor Truck Co. will be taken at a meeting of stockholders on Saturday, April 28. Under the plan it is proposed to transfer stock to make it possible to issue \$135,000 in bonds to retire the debt on the plant and provide working capital.

During the past year the liabilities were reduced by more than \$100,000 and sales in the first quarter of 1923 were more than half of all trucks sold in 1922. Prospects for new business are now considered excellent and stockholders are generally pleased with the plan, it is stated.

The plant has orders for fourteen trucks for immediate shipment and has established more than eighty local agencies in Wisconsin alone.

Southern Truck Factory Purchased for \$35,000

GREENSBORO, N. C., April 21—R. G. Vaughn of this city has purchased the plant, equipment and real estate of the Southern Truck & Car Corp. The price paid was approximately \$35,000.

The company was organized during the war days, bought heavily of supplies and began the manufacture of trucks. When the depression came the company was overloaded and went into the hands of a receiver in 1921. The stockholders finally raised money, paid the debts and reorganized the company in January of this year.

Since that time the plant has been operated as a repair and paint shop. Plans, however, were being made to resume the building of trucks. No announcement has been made by Vaughn as to his intentions.

38,792 Cars and Trucks Built by Ford in Week

DETROIT, April 20—Production at the Ford plant for the week ending April 17 was 38,792, setting a new high mark and exceeding the previous week by 999. Production every day was in excess of 6300, the largest single day being Tuesday with 6573.

Tractor production in the first quarter of the year was 27,087 as compared with 8340 for the first quarter of 1922. A growing use of the tractor is noted by the factory in general industrial and commercial fields.

Duesenberg Charges Dismissed by Court

Judge Says That They Are Without Basis and Refuses to Appoint Receiver

INDIANAPOLIS, April 20—Superior Judge James M. Leathers last night denied the appointment of a receiver for the Duesenberg Automobile & Motors Co., petitioned for by Peter A. Pfisterer, a stockholder.

The case consumed three days and the court audit of the company's books and corporate minutes and testimony failed to substantiate the charges.

Announcing his decision, Judge Leathers said:

Pfisterer's charges of mismanagement, dissension, extravagance and insolvency are unfounded. His allegations are not proved by the evidence. I can see nothing to justify his charges.

The company, during a period of slump in the whole industry, consequent delay in starting, and subsequent time spent in development of the motor and car, has unquestionably succeeded in producing an automobile of national reputation, and an invaluable asset.

It would be foolhardy to shatter this industry, which has successfully passed a period of development and experiment, and is now entering the stage of "profitable production."

The plaintiff admitted on the witness stand that he had no figures or authentic information to substantiate the charges. His information as to the company's alleged condition was supplied by a confidential source. He refused to give names, and admitted swearing to the complaint and charges although he had no substantiating data.

Pierce-Arrow Executes Mortgage for \$6,000,000

BUFFALO, April 20—The Pierce-Arrow Motor Car Co. has executed a corporate mortgage of \$6,000,000 to the Central Union Trust Co. of New York, as trustee, on which \$4,200,000 bonds have been certified and delivered, papers filed in the county clerk's office show. The Elmwood and Grant Arrow properties and the plant and machinery of the company are given as security.

The documents were signed by M. E. Forbes, president, and E. C. Pearson, secretary, for the automobile concern, and A. Ferguson, vice-president, and F. Wolfe, assistant secretary for the trustee. A mortgage tax of \$21,000 was paid to the county clerk.

DURANT HAS OFFICE IN SOUTH

ATLANTA, April 24—A Southern branch office has been opened in the Healey Building, Atlanta, by Durant Motors, with Walter Johnson, formerly of San Francisco, in charge as manager.

Joy Withdraws Bid for Liberty Plant

No New Bidders Entered and Proposed Sale Is Postponed to May 8

DETROIT, April 24—Sale of the Liberty Motor Car Co. was again postponed by the receiver today to May 8, this time, however, in the absence of any bidders. The Henry B. Joy qualifying deposit had been withdrawn and there were no new bidders. The conditions of the sale as now existing will continue, the receiver said, the upset price remaining at \$1,175,000.

No explanation was given of the withdrawal of Joy as a possible purchaser, and a consequent continuance of the company under much the same management as present except that he had been unable to complete his plans and had withdrawn to clear the field for other possible buyers.

There is reason to believe that the Joy plans considered the possibility of interesting André Citroën in the Liberty property. Citroën was not prepared to take definite action at this time however.

As the situation stands for the present, the receiver will continue to administer the company and conduct it as a going concern. After the May 8 date, if there is no sale, the matter will be referred back to the court for a reconsideration of the sale terms. Other persons interested in the purchase of the property are understood to have withheld bidding because of the price fixed.

General Motors Directors Name Page Vice-President

DETROIT, April 23—The reorganization meeting of the directors of the General Motors Corp., following the annual meeting in Wilmington, Del., was held here last Saturday.

The only change in personnel was the election of De Witt Page, president and general manager of the New Departure Manufacturing Co., as a vice-president, Page having been elected a director at the Wilmington meeting.

KLEIBER TO MOVE BRANCH

ATLANTA, April 24—The Kleiber Motor Truck Co., which established a southern branch plant here about two years ago, and which has been operating the plant steadily ever since, is preparing to close the branch and remove the entire equipment to the parent factory at San Francisco, Cal. The company built and owns the building it occupies in Atlanta.

RIVETT LATHE PLANT SOLD

BOSTON, April 24—The plant, equipment and business of the Rivett Lathe & Grinder Co., which has been in re-

ceivership since March of last year, has been sold by the receiver. The purchaser is the creditors' protective committee, which is organizing the company under the name of Rivett Lathe & Grinder Corp. Sufficient new money has been subscribed to put the company on a strong financial basis, it is stated. The present management, under the direction of T. S. Ross as president and general manager, will operate the plant.

Ford May Change Site of Factory in England

LONDON, April 12 (by mail)—Reports from Southampton, where the Ford Motor Co. after lengthy negotiation secured land a few months ago, on which to erect a larger and more conveniently situated assembly plant, to displace the existing plant at Manchester, state that unexpected difficulties have arisen concerning the foreshore rights of the plot where it abuts Southampton Water.

As a result the erection of the new plant is in abeyance, negotiations with the owners of the foreshore having proved abortive, and although the preliminary work of clearing the site has been started, the belief is gaining ground that the project will have to be abandoned so far as Southampton is concerned.

Truck Makers Will Hold Show During September

DETROIT, April 23—The directors of Motor Truck Industries have made definite plans for a dealer and user commercial vehicle show to be held in the Coliseum, Chicago, Sept. 1 to 7.

Although primarily a specialized vehicle show, all makes of commercial vehicles and parts will be invited to display. In addition to trucks there will be taxicabs, rail cars, trailers and all forms of transportation.

The service feature of the show will be particularly emphasized and the association will have a series of talks on this subject. Reservations are already being made for space.

Cumberland Tire Sued for \$132,000 on Notes

LOUISVILLE, KY., April 20—Suit for \$132,000 alleged to be due on five promissory notes, given two years ago, was filed in Jefferson Circuit Court yesterday by the Ten Broeck Tyre Co. against the Cumberland Tire & Rubber Co. An order for the sale of the property involved, to satisfy the claims, also was petitioned.

The notes were given when the tire plant here was deeded by the Ten Broeck company to the Cumberland company. The deed showed the transaction was made for "\$1 and other valuable considerations hereinafter received." Specific mention was made, according to the petition, of the five promissory notes upon which the suit was brought.

Good Year Forecast in Packard's Report

For Six Months Ended February 28 Company Shows Net Profit of \$4,435,559

DETROIT, April 23—The consolidated balance sheet of the Packard Motor Car Co. as of Feb. 28, 1923, the end of the first six months of the company's fiscal year, shows total assets and liabilities of \$55,317,770, with surplus of \$7,969,583. Cash and government securities total \$15,412,930 and inventories \$11,927,149, of which approximately \$6,200,000 was in finished cars and trucks, sold and unsold, at factory and branches.

Since the date of preparation of the statement the company has redeemed the \$5,915,000 outstanding ten-year 8 per cent gold bonds dated April 15, 1921, thus making the company, according to President Alvan Macauley, free from liabilities other than those for current purchases, pay-roll and accrued taxes. After retirement of bonds the company had \$13,758,950 in cash and marketable securities.

Macauley's letter to stockholders accompanying the statement is dated April 19. In it he says the outlook for the last half of the fiscal year is very good and that it seems reasonable to expect that that period will be at least as profitable as the first half. Demand for the company's products is excellent, he said, and the factory is regularly meeting its enlarged production program.

Gross Profit of \$5,725,775

The consolidated income account for the six months shows factory sales \$25,773,923 with gross profit of \$5,725,775. Selling, general and administration expense, including Federal taxes, was \$1,335,273 which, with interest and discount deductions, brought profit from factory operations to \$3,988,389. This coupled with profit from branches and subsidiary companies of \$447,169 made total net profit of \$4,435,559.

Property account shows that expenditures of \$1,216,674 were made in the first six months of the fiscal year for new machinery and equipment, and that \$1,350,086 was charged off in this period for depreciation and obsolescence.

Macauley's statement notes that the company is now shipping in excess of 2000 vehicles monthly, resulting in inventory turnover approximately seven times a year.

CURTISS PLANS APPROVED

LONG ISLAND CITY, N. Y., April 15—Plans for the reorganization of the Curtiss Aeroplane & Motor Corp. have been approved by the stockholders. There will be no new financing, and the present capitalization will be scaled down. There will be two companies in the future, one manufacturing and the other to liquidate other assets.

Company Will Decide Jordan Resale Price

**Lists Will Be Uniform, According
to Zones, and Be Announced
Nationally**

CLEVELAND, April 25—Effective May 15, the Jordan Motor Car Co. will put into force a new standard national policy which will govern the handling of used cars by Jordan dealers, which it is believed, will stabilize resale values and make the used car an asset instead of a liability so far as Jordan dealers are concerned.

In brief, the factory is going to take a hand and help its representatives dispose of at a profit Jordan cars taken in trade, fixing prices and certifying that each has been thoroughly overhauled by the dealer making the sale.

Metal Plate as Guarantee

The keynote of the policy is a metal plate, registered by the company at Washington, which will be issued upon proof by the dealer that he has complied with the standard regulations, reading "The Mark of Jordan Service." This will be attached to the dash underneath the hood just above the starting motor.

This plate will guarantee to the purchaser that the car on which it appears has been rebuilt in accordance with the national standard Jordan policy to which every Jordan dealer has subscribed.

Before this plate is issued, however, the dealer must make a careful examination of the car offered in trade, noting what must be done to put it into a condition prescribed by the factory. The dealer must note on a special blank what repairs are needed and must sign an agreement to do this work before the company will issue the metal plate.

Assured by this that each resale car is in exactly the same mechanical condition, the company itself will set the resale price. In order to reconcile these prices with the varying freight charges in different sections of the United States, the country has been divided into six zones.

Prepares for Changing Conditions

The week following the adoption of this policy, prices of the Models M, MX, F and H series will be announced nationally, with different prices for the different zones. From time to time, as may be considered advisable owing to changing conditions, these prices will be revised in accordance with the reports received from dealers in all sections of the United States. Distributors and dealers will receive letters from the factory a sufficient time in advance so that they will have plenty of time to make recommendations regarding revisions in prices.

SMOOT SEES NO TAX REVISION IN SIGHT

WASHINGTON, April 24—Senator Smoot has expressed the opinion that revision of revenue laws will not be feasible at the next session of Congress. He has indicated frankly that a downward revision of surtaxes probably could not be enacted, even if it were recommended, because the next Congress will be composed of various so-called blocs. These blocs undoubtedly would oppose vigorously any such action and in all probability would be powerful enough to prevent it.

It is also felt by Senator Smoot that the present law should be allowed to develop its weaknesses over a longer period before a general revision is undertaken.

Under this plan, the owner making the trade is going to profit according to the condition of his car. If he has been careful and the car is in good shape, he will get more for it than his neighbor who has neglected his Jordan. In appraising the used car, the dealer will bear in mind the price set on that particular model by the factory. He will figure on the cost of his overhaul and a legitimate profit before telling the customer how much the allowance is.

How Plan Would Work

For instance, if the car happens to be one on which the factory has set a resale price of \$950 and the dealer estimates the cost of overhauling to be about \$50, and allowing for a profit of \$50, the price the dealer could allow would be around \$800. If the car needed \$300 worth of work before bringing it up to the Jordan standard, the allowance could not be more than \$550.

\$19,406,123 Was Earned by G. M. C. Last Quarter

NEW YORK, April 26—General Motors Corp. for the quarter ending March 31 reports earnings, after taxes, available for the debenture and preferred dividends of \$19,406,123. This is equivalent to 11.4 times the dividend requirements on the debenture and preferred stock.

After deducting dividends for the first quarter and the senior securities, there remains \$17,704,199 earned on the common stock. This is equivalent to 8.6 per cent on the 20,646,327 outstanding shares of common stock valued at \$10 per share upon the books of the corporation or at the annual rate of 34.4 per cent.

In the first quarter there were sold 176,417 cars and trucks, compared with 71,039 in the first quarter of 1922. These sales include Buick, Cadillac, Chevrolet, Oakland and Oldsmobile passenger and commercial cars and G.M.C. trucks.

Sales Growth Shown by G. M. Acceptance

**Business of Last Quarter More
Than Doubled Same Period
Year Ago**

NEW YORK, April 23—The General Motors Corp. has taken all of the authorized increase in the capital stock of the General Motors Acceptance Corp. of 12,000 shares for a cash consideration of \$1,420,000.

This additional capital was required because of the greatly increased volume of business being done by the Acceptance corporation, which reports that the business of the first quarter of 1923 was more than double the corresponding period of 1922.

Altogether, this report is a most satisfactory one and rounds out a full four years of operation, in which time the corporation has successfully provided financial accommodation of close to \$400,000,000 to dealers in and purchasers of General Motors products.

In the four years the retail plan has required \$187,183,935; the wholesale plan, \$166,999,590 and the foreign department, \$38,143,452. In the quarter just ended retail took \$17,192,894, wholesale \$33,432,293 and foreign \$4,100,876. The retail value of the products represented in the four years of financing runs well over half a billion dollars.

Collections Reported Better

The corporation reports its collections as better than any previous experience, only 34/100 of 1 per cent of domestic receivables as of March 31 being 90 days or more overdue. On March 31 the corporation had domestic obligations outstanding at discount of \$56,378,602.

The balance sheet as of March 31 shows total assets consisting practically entirely of cash and quick receivables of \$69,182,092. Capital, surplus and profits stood at \$6,463,149, not including additional capital funds of \$1,420,000 acquired in April. Domestic obligations outstanding amounted to \$56,378,602; total reserves, \$1,143,009; interest and charges received and held in deferred income account, \$1,395,273.

Price War May Follow Cut by Standard Oil

NEW YORK, April 23—Reduction of one cent a gallon in the wholesale price of gasoline by the Standard Oil Co. of New Jersey is regarded as the opening of a war of prices with the independents. It is said that Standard is feeling the competition of its rivals and that while the volume of business is increasing, the big company is not holding its percentage.

As a reason for the reduction, it is claimed that it has been brought about by record breaking production in California.

Added Funds Fortify Apperson's Position

Obtains \$1,083,000 Through Interesting Outside Capital for First Time

KOKOMO, IND., April 24—Apperson Bros. Automobile Co. has strengthened its financial position by successfully putting out a bond issue of \$700,000 and three year debenture notes for \$383,000, making a total of \$1,083,000, which has been used in funding the company's bank loans and materials accounts and in providing a working fund for increased production. This is the first time the company has interested outside capital.

At the same time E. L. Apperson has been advanced to the position of chairman of the board of directors, in charge of engineering and production, while N. H. Van Sicklen, now is president and general manager, functioning as chief executive. B. C. Buxton, formerly a prominent Chicago dealer, has been named as vice-president in charge of finance, while E. M. Lubeck is general sales manager.

Kettering Will Address Factory Service Chiefs

NEW YORK, April 24—C. F. Kettering, president of the General Motors Research Corp., will be the principal speaker at the spring convention of factory service managers to be held in Detroit May 15 and 16 under the auspices of the National Automobile Chamber of Commerce. In addition to Kettering, there will be several other speakers of note.

L. V. Pulsifer, vice-president of Valentine & Co., will speak on the subject of overcoming paint troubles. This is very much the identical subject covered in his paper before a recent meeting of the Society of Automotive Engineers. The subject, however, will take on a slightly different aspect before the service managers.

J. H. Newmark, manager of the sales promotion department of the General Motors Corp.; Richard Harfst, general manager of the Cadillac Detroit Branch, and T. W. Holloway, instructor at the Cadillac Technical School, will also be among the speakers.

Harfst will tell about the plan of individual service or the assignment of the same man to the same customer wherever possible and Holloway will describe methods of instructing dealers' mechanics.

KALO BATTERY MOVES EAST

NEW YORK, April 25—The Kalo storage battery, originally introduced and manufactured in California, has been moved east and is now manufactured by the Oneonta Storage Battery Corp., Oneonta, N. Y. A two story factory has just been completed.

COST IS \$99.21 YEAR TO KEEP FARM HORSE

DES MOINES, IOWA, April 24—Figures recently obtained by the extension department of the Iowa State College show that the average total yearly cost of keeping six horses on Iowa farms of approximately 160 acres amounted to about \$600.

The net cost per horse was found to be \$99.21. During the year, each horse worked on an average of 723 hours. Figuring on the basis of a ten-hour work day, the average cost was \$1.37 per day or 13.7 cents per hour of actual work done.

The horses on some farms worked from two to three times as many hours per year as those on other farms.

The Kalo Sales Corp., has opened offices in the Fisk Building to act as factory distributors. T. A. Frey is president and H. V. Andrews, treasurer. R. N. Brown, formerly connected with the Pyrene Manufacturing Co. and the Ingersoll Watch Co., has been appointed sales and advertising manager. The company is now turning out 120 batteries a day.

Proposed Frame Merger Plans Told Stockholders

DETROIT, April 25—Stockholders of the Parish & Bingham Co. of Cleveland and the Detroit Pressed Steel Co. have been notified of the proposed merger into a new corporation to be known as the Midvale Steel Products Co.

It is proposed to sell an issue of \$2,500,000 7 per cent convertible bonds to a banking syndicate in order to provide working capital. Beside this, there would be \$7,000,000 8 per cent cumulative and participating preferred, representing the purchase price of the two companies, divided equally.

In addition there would be an issue of 50,000 shares of no par common, to be held by the banking syndicate and by E. J. Kulas, president of the Parish & Bingham Co.

St. Louis Plant of Ford Will Rank with St. Paul

DETROIT, April 25—The Ford Motor Co. is planning a large development of its assembly facilities in the St. Louis district, but pending the selection of a plant site and completion of preliminary details the company will make no statement as to the extent of its development.

The St. Louis project will rank with that of St. Paul in size and will be the next big activity undertaken. The present plant will be superseded by the new factory which will be more modern in construction and designed to meet the greatly increased business.

Egypt Taking Steps Upward, Says Drake

As for France and England, Time Will Be Needed to Adjust Affairs

NEW YORK, April 26—J. Walter Drake, chairman of the Foreign Trade Committee of the National Automobile Chamber of Commerce, returned yesterday from the International Chamber of Commerce meeting at Rome, crossing on the Olympic, having also visited Egypt, France and England.

"Two or three years will be needed for the foreign trade situation between this country and Europe to work out favorably," Drake says. "Particularly is this true of Italy and France. In Italy living conditions, wages and materials are at such cheap levels that American products cannot compete.

"Living conditions, however, are bound to improve, with consequent higher cost of production, greater buying power and better markets for American goods. The thing that will be most beneficial to international trade is a more thorough understanding by Europe and ourselves of each other's difficulties.

"Egypt is one of the few countries whose currency is nearly at par. Under the British protectorate the country is improving rapidly. Irrigation and other modern methods are being introduced. Motor travel is sure to increase."

Johnston Will Represent G. M. C. at Constantinople

NEW YORK, April 25—More stable business and political conditions in Turkey, the Balkans and the Near East are expected to bring about increasing automotive sales, according to an announcement of the General Motors Export Co., stating that one of its representatives, C. S. Johnston, would sail for Constantinople early in May.

Johnston, who formerly served as American commercial attaché at the Hague, will remain permanently at the Turkish metropolis and will have supervision of the company's activities in the stretch of territory from Jugoslavia to Egypt.

General Motors has maintained offices and representation in Constantinople for some years, being represented there by Lewis Heck, who has resigned to go into business on his own account.

J. S. MARVIN MARRIED

NEW YORK, April 26—J. S. Marvin, assistant general manager of the National Automobile Chamber of Commerce, who has been associated with the chamber for many years, and Mrs. A. L. Curtis were married at the home of the bride's mother in Brooklyn yesterday, and left for a short stay at Hot Springs, Va.

Clydesdale Bus Has Six-Cylinder Engine

Announced Also That New Product Is Equipped with Four Wheel Brakes

CLYDE, OHIO, April 24—Four wheel brakes and a six-cylinder engine are among the unusual features incorporated in a new design of bus, just announced by the Clydesdale Cars Co.

This chassis is said to be adaptable to practically any bus body seating from fifteen to twenty-five persons and, it is claimed can be operated at speeds as high as 50 m.p.h. The bus is overgeared on fourth speed. It has a flat top frame, the upper surface of which is 28 in. from the ground. Particular attention has been given to provide an easy riding vehicle which shall be as free as possible from vibration.

The engine is a Continental, said to develop 70 hp. at 2200 r.p.m. The brakes on all four wheels are operated by pedal through a compensating mechanism which is designed to equalize the pressure on all brake shoes. The rear wheel drums contain two pairs of brake shoes each. One pair is operated by foot and the other by hand.

Brown-Lipe Gearset Used

The gearset is a Brown-Lipe product, fitted with Timken roller bearings. The gear ratios are as follows: First, 3.29 to 1; second 1.61 to 1; third, 1 to 1; fourth, 0.78 to 1.

Other parts include a multiple disk clutch, a rear axle with overhead worm giving a 7.2 to 1 reduction, semi-elliptic springs measuring 44 x 3 in. front and 60 x 3 in. in the rear.

The frame is 8 in. deep and is cut away for clearance above the rear axle, this section being reinforced by a drop forging to give adequate strength without departing from the straight top frame.

Fuel is carried in an 18 gal. tank under the rear end of the frame and is fed to the carburetor through a vacuum tank. The steering gear is a worm and nut type with 20 in. wheel. Equipment includes 20 in. wheel with 32 x 6 in. tires.

The chassis measures 271 in. overall and has 58 in. track and 198 in. wheel-base.

\$1,975 Studebaker Coupe Is Added to Big Six Line

SOUTH BEND, IND., April 24—The Studebaker Corp. has just announced an addition to the Big Six line, a five-passenger coupe to sell for \$1,975. The rear seat extends across the full width of the body while the driver's seat and the auxiliary seat are of the bucket type and identical in design. The upholstery is mohair velvet plush and the hardware is silver satin finish. A large trunk is carried at the rear with button type cover.

The equipment includes heater, jeweled eight-day clock, glare proof glass visor, rear view mirror, walnut all wood steering wheel with new type spark and throttle control, runningboard step pads with aluminum kick plates and flower vase, in addition to the regular Studebaker equipment. A courtesy light on the drivers' side illuminates the roadway at the side of the car.

Marmon Lists Speedster, Now Building, at \$3,435

INDIANAPOLIS, April 23—Production is now under way on a new four-passenger Marmon speedster to sell for \$3,435. Deliveries will start early in May.

While resembling the Marmon line in general, the lines of the body are made more flowing and some additional equipment is added. A collapsible top is fitted with natural wood bows. There are polished protection bars at the rear, trunk rack, trunk and cover, a tire carrier forward on the right runningboard and a Moto-Meter.

Franklin Now Producing New \$2,250 Demi-Sedan

SYRACUSE, N. Y., April 23—Franklin is just out with a new demi-sedan priced at \$2,250. It is mounted on the standard Franklin chassis and has sliding glass panels on all four doors and the rear compartment so that any degree of ventilation can be secured.

It is designed to carry five passengers. The body is of aluminum with fine lines, long, low and roomy. The upholstery is leather with curled hair. The top lining is whipcord and the fittings are inlaid Duralumin.

Sedan Model of Westcott Follows Brougham Lines

SPRINGFIELD, OHIO, April 24—A new sedan model has been added to the Westcott line, the lines of the brougham being closely followed.

A new type of windshield has been fitted, this having a solid upper panel and a framework integral with the body. The lower half is adjustable by a lever working over a quadrant.

Two spare tires are carried on the sides and a touring trunk is on the rear.

DORT MODELS DROPPED

FLINT, MICH., April 24—The Dort Motor Car Co. has discontinued the four and six cylinder Yale coupés and sedans, which were priced at \$1,020, \$1,070, \$1,145 and \$1,195.

TO LIQUIDATE WISCONSIN TOP

RACINE, WIS., April 23.—Steps to liquidate the business of the Wisconsin Top Co. have been taken by creditors. It is believed that a dividend of at least 10 per cent can be paid on claims. The assets are approximately \$350,000 and the liabilities \$230,000.

"Rollin" to Be Made in Cletrac Factory

Will Sell for Less Than \$900—Early Start on Production Likely

CLEVELAND, April 24—A new passenger car designed by Rollin H. White, former vice-president and chief engineer of The White Co. and for some years president of the Cleveland Tractor Co., will be put on the market.

It will be manufactured by the Rollin Motor Co. in the plant of the Cleveland Tractor Co. The car will be a four cylinder and will list at less than \$900.

Directors of the company are: Rollin H. White, R. T. Hodgkins, R. T. Sawyer, E. E. Allyne, Fred W. Goakes, R. B. Tewksberg, Warren P. King, E. W. Moore, Joseph H. Champ and E. R. Smead.

The \$5,000,000 plant of the tractor company is equipped to swing into production of the new car at an early date.

Stockholders of the Cleveland Tractor Co., at their annual meeting, directed that a contract be entered into with the newly organized Rollin Motor Co. for a lease of the plant of the tractor company and recommended that quantity production of the new car be begun as soon as possible. The Cleveland Tractor Co. will not lose its identity under the new arrangement except that the Cletrac tractor and Rollin car will be made by the Rollin Motor Co.

Cletrac Dealers to Take Output

At the stockholders' meeting, White and Hodgkins, vice-president and general manager, stated that more than 800 Cletrac dealers would readily absorb more of the cars than could possibly be produced. Hodgkins stated that he had already received from ten distributors' territories dealer applications aggregating orders for 8000 "Rollin" cars.

The "Rollin" has several interesting features in design, such as spring construction which makes for a three point frame suspension. In tests it took all hills near here on high and at exceptional speed. It is comparatively light in weight and it is claimed that the car will do upward of 30 miles per gallon of gasoline.

Jordan Starts Producing New Four-Door Brougham

CLEVELAND, April 24—A new four-door brougham has just been started in production by Jordan and will sell for \$2,285. The lines of the body are long, low and well rounded to get away as far as possible from sharp corners.

The doors swing wide, and the cushions have a comfortable tilt. The upholstery is in broadcloth and the interior fittings in platinum finish. A trunk containing two suitcases is built on the rear.

Men of the Industry and What They Are Doing

Stranahan Sails for Europe

R. A. Stranahan, president of the Champion Spark Plug Co. of Toledo, has sailed for Europe, his itinerary calling for stops in the various Continental capitals to study trade conditions. Champion's European business has expanded so rapidly that Stranahan feels it necessary to investigate the question of distribution.

John N. Willys in Air Work

John N. Willys, president of the Willys-Overland Co., has accepted the Toledo chairmanship of the National Aeronautical Association of the United States, which will function in that city through the Chamber of Commerce. Newton D. Baker, former secretary of war, is the chairman for the fifth district, which comprises the States of Ohio, West Virginia, Indiana and Kentucky.

Hudson Advances Whittaker

Joseph H. Whittaker has been appointed factory manager of the Hudson Motor Car Co. and will have entire supervision over all departments of manufacture. Recently he served in the capacity of superintendent of planning and production and has been with Hudson for thirteen years.

Holloway Back to Old Work

Thurman W. Holloway, who has been in charge of the school for technical and mechanical construction conducted by the Cadillac Motor Car Co. at its factory, has returned to his former position as assistant technical manager with Ernest C. Garland. William Holmes, whom he relieves, has undertaken special duties in assisting Lynn McNaughton, general sales manager, and Jay W. Dunnigan, manager of distribution.

Cuno Engineering Appoints Hance

A. B. Hance, formerly covering the northwest territory for the Cuno Engineering Co. of Meriden, Conn., has been appointed general sales and advertising manager of the company, which manufactures the electric match and other electrical automotive products.

Will Return to Bureau of Standards

Dr. H. C. Dickinson, director of research of the Society of Automotive Engineers, will leave the society about May 1 to return to the Bureau of Standards as chief of the Division of Heat and Thermometry. This division includes the automobile power plant section.

Dr. Dickinson came to the S. A. E. two years ago when the research department was first established. He has placed this phase of the society's activities on a sound basis and has put under way considerable work of a constructive character.

The chief activity of the research department, as developed under Dr. Dickinson's administration, has to do with comparative tests of fuels, conducted in cooperation with the American Petroleum Institute, the Bureau of Standards and various automotive manufacturers and fuel refiners. Research data on other subjects also have been accumulated and indexed for ready reference of S. A. E. members.

No successor has been named to Dr. Dickinson.

Paxton Made Division Manager

Claude H. Paxton, for six years Northwestern district manager for the Federal Rubber Co., with headquarters in Minneapolis, and later sales promotion manager for the Franklin Automobile Co., Syracuse, N. Y., has succeeded C. M. LeRoux as Northwestern division manager for Willys-Overland in Minneapolis. LeRoux has been transferred to Southern headquarters in Atlanta.

W. P. Loveless Promoted

W. P. Loveless has been advanced from sales manager of the William R. Johnston Manufacturing Co. of Chicago to the position of assistant general manager. He is succeeded as sales manager by C. B. Johnston, who has been eastern representative of the company for the last year.

Corduroy Tire Names Vestal

E. G. Vestal has been appointed western district manager of the Corduroy Tire Co., with headquarters in San Francisco. He was formerly general western manager for the Madison Tire & Rubber Co. and was general representative of Racine for four years.

Mooney Forms Own Agency

Frank J. Mooney of Detroit, for the last fifteen years associated with the industry as a factory executive and also identified with the advertising agency business, has formed the Kelsey-Mooney-Stedem agency in San Francisco, taking over the business of the Advertising Service Co. The new company will handle only national and sectional business.

Shanks with Zimmer-Keller

Charles B. Shanks, formerly with the Snodgrass-Gayness advertising agency of New York City, has been elected vice-president of the Zimmer-Keller agency of Detroit and placed in charge of the Cleveland office.

Martin With Automobile School

Paul P. Martin, formerly of the Green-Fulton-Cunningham Agency, has been appointed assistant advertising manager of the Michigan State Automobile School of Detroit.

LeBarre Distributing for Sizer

Rowland S. LeBarre has incorporated the LeBarre Steel Co., with headquarters in the Union Building, Cleveland, for the purpose of acting as distributor in Indiana, Michigan, Ohio, Illinois and Wisconsin of the Sizer Steel Corp.'s products. LeBarre started in the order department of the Illinois Steel Co., Chicago, in the nineties, and in 1902 was sent to New Orleans when a joint office was opened by the Illinois, Carnegie and American Sheet Steel companies. In 1905 he was transferred to the Cleveland office as assistant manager of sales, remaining there until July, 1919, when he joined the Interstate Iron & Steel Co. at Chicago, in charge of its alloy sales. His resignation from the latter company became effective March 1.

Rickenbacker Predicts Good Trade All Summer

DETROIT, April 23—Reporting on the result of his survey of business conditions, made after trips through New England, southeastern States and Texas, E. V. Rickenbacker, vice-president in charge of sales of the Rickenbacker Motor Co., predicts continued activity in the automobile world throughout the summer.

In his résumé, he says:

In the Eastern states and as far West as Chicago, business is excellent—no abnormal demand but still greater than the average at this time of the year, neither the Middle West nor the South has been buying, however, during the last three years. They were hit pretty hard by labor costs and low prices of their products. Most farmers too, had loaded up with more land than they could swing at war prices. They have now liquidated and are not only in a buying mood but are able to buy.

Weather conditions guarantee bumper crops again and if European conditions can be stabilized they will again receive high prices for grain, live stock and other products. Cotton already is at a figure that means affluence for the grower.

On my last trip I found a wonderful change West of the Mississippi and more recently discovered the same symptoms south of the Ohio and in all the cotton states. California is El Dorado again and there is a heavy demand west of the Rockies, while the Middle West seems extremely prosperous.

Ford Plant in Charlotte to Have 75,000 Capacity

ATLANTA, April 24—The Atlanta office of the Ford Motor Co. advises that a new assembling plant is to be established shortly in the Southeast, the new plant to be located at Charlotte, N. C.

It will cover about an eight-acre site and have an annual assembling capacity of about 75,000 cars. Joseph W. Holt is manager of the Charlotte branch.

Several thousand dollars is also being invested in enlarging the Atlanta plant.

Trade Associations Helpful to Industry

Replies in U. S. Chamber Referendum Show Wide Approval Given Them

WASHINGTON, April 23—Results of the referendum taken by the Chamber of Commerce of the United States on trade associations show approval of those organizations by business bodies in general. Eight separate propositions relative to the activities of trade associations were submitted, the affirmative prevailing by good majorities in every case.

Eight Propositions Submitted

The propositions were:

First: Because of numerous useful and important functions of obvious propriety trade associations should exist for each important branch of industry and commerce.

Second: A trade association should have such a membership that it can be representative of the industry in connection with problems affecting the general advance of the industry.

Third: A trade association should be prepared to consider all problems affecting the general advance of its industry or branch of commerce.

Fourth: Trade associations should continue free from special forms of governmental control.

Fifth: Statistics of capacity, production, stocks, and sales should be collected by a trade association for its industry or branch of commerce.

Sixth: Statistics of actual prices in closed transactions should be collected by a trade association for its industry or branch of commerce.

Seventh: Any interpretation of statistics or other comment which could induce or facilitate concerted action on the part of members should be omitted by a trade association.

Eighth: Statistics of capacity, production, stocks, sales and prices a trade association should make as available to the public and to Government agencies interested in following the course of the industry and commerce as to members.

In the automotive industry several associations of manufacturers, such as the National Automobile Chamber of Commerce, the Motor and Accessory Manufacturers Association and the Rubber Association of America, compile, issue to members and make public statistics on production, stocks, sales, etc., mentioned in the fifth and eighth propositions above.

A. E. A. Does Cooperative Work

The Automotive Equipment Association, which includes that one branch of the industry and its customers, that is, manufacturers and jobbers, does not handle statistics along these lines, but does much cooperative work along lines of general advance of the industry, as indicated in the third proposition.

The work of the National Automobile Dealers Association and various State and local associations is along similar lines, disseminating information and taking action on legislative and other sub-

jects for the good of the industry.

Numerous local trade associations and used car bureaus compile and issue to members prices in closed transactions, that is, prices obtained on sales of used cars as indicated in the sixth proposition. Several of these organizations make used car price information available for the public as well as for members.

The Chamber of Commerce committee, in issuing its report, expressed itself as of the opinion, "that, while a minority of trade associations may have engaged in practices which have laid them open to complaint under the law with respect to restraint of trade, the vast majority have proved their great value for the advancement, day by day, of the processes of production and distribution."

In expressing opposition to Government control of trade associations, the committee said:

The possibility that a trade association may err by violating a statute no more justifies any attempt on the part of governmental authority to control trade associations in all their activities than the possibility of illegal acts on the part of individuals warrants like supervision over all their actions. Such supervision would inevitably restrict the freedom of action of trade associations in meeting the problems which they exist to solve.

Makes Three Recommendations

The committee laid down as its recommendations three rules with relation to the statistical activities of trade associations as follows:

Reports to members of their association should be accurate and sufficiently complete to prevent misconstruction.

As distributed to the membership, the statistics should not be accompanied with any interpretation or other comment which could induce or facilitate concerted action on the part of members.

All statistics regarding prices should be confined to closed transactions and should not refer to pending transactions or future transactions.

Ford Reopens Portland Plant, Closed Since War

PORTLAND, ORE., April 21—State and city officials took part in the official celebration marking the reopening of the Ford Motor Co. plant here. Governor Pierce was the guest of honor at the occasion, while additional officials who were on hand were Secretary of State Kozier, Mayor Baker, Portland city commissioners and others.

The Portland branch, which supplies Ford cars to dealers throughout Oregon and the Columbia River counties of Washington, was originally constructed as an assembly plant, but that branch of the work was closed down during the war.

Arrangements for reopening the plant were made on the occasion of a recent visit of Edsel Ford. The assembling machinery and necessary supplies recently arrived from Detroit.

The branch is now operating on a basis of 40 cars per day, but in view of the heavy demand expects to increase this to 60 cars per day in May.

I. C. C. Investigates Joint Freight Rates

On Complaint of New Haven Railroad It Is Now Studying Legality of Tariffs

WASHINGTON, April 24—The Interstate Commerce Commission has started an investigation to determine the legality of tariffs providing for joint transportation by motor trucks, ships and railroads from interior Connecticut points to destinations in the Southeast via New Haven and Atlantic ports, thus marking the first time the rate regulating body has given official attention to motor truck transportation in connection with rail and water transportation.

Railroad Rates Higher

Under the tariffs the motor, rail and water carriers held themselves out to carry traffic at rates lower than those offered by the New York, New Haven & Hartford Railroad and the steamship lines. The New Haven protested against the competition. The reduction in rates is made possible by the combination of the motor trucks, coastwise steamship lines and the Southern railroads, the trucks carrying traffic from the interior of Connecticut to New Haven for less than the New Haven Railroad.

Since this investigation started it has been pointed out that the Pennsylvania Railroad has been most successful in operating motor trucks to supplement the handling of freight in conjunction with its steamer lines operating between Baltimore and points on the Eastern shore of Maryland. The beginning of this service was made about the first of the year at Cambridge, Md., with motor trucks operated under contract with the Stone's Express Co. of Boston, the charter of the Pennsylvania Railroad preventing operation of the trucks directly by the Pennsylvania.

At Cambridge the freight is loaded on the trucks and deliveries are made as far east as Salisbury and as far north-east as Denton. Returning, the trucks collect the shipments for Baltimore which are delivered to the shipper at Cambridge, thus providing a one-day service between Baltimore and the principal points on the Eastern shore of Maryland.

Service Will Be Extended

As soon as some additions are made to the State road system and highways are constructed to other water points on the Chesapeake Bay, it is proposed to extend this truck service from these water points where connection also will be made by steamer. It is expected also that some of the steamer lines will be replaced by motor trucks, because the expense of operation of the steamer lines when contrasted with the operation of motor truck lines favors the use of motor trucks.

Bus Grows in Favor Through Southeast

More Lines Are Being Placed Due to Greater Development of Highways

ATLANTA, April 24—Due to the enormous amount of money that is to be invested in the various southern States this year in the construction of good roads and the maintenance and improvement of present roads, 1923 is expected to prove the biggest year in the history of the section in the development of the bus industry, according to automobile distributors here who are finding a market in the Southeast for the motor bus.

Bigger Road Programs Planned

Last year some \$40,000,000 was added to the highway building and improvement funds in the district, and the outlook for the present year indicates a still greater period of activity, for practically all southern States are preparing to carry out even more extensive road programs than heretofore.

The bus transportation industry has experienced its principal development the past few months in Georgia and Florida, both these States now being interwoven by bus lines so that it is possible to reach almost every city and town of any consequence in that way.

Whereas a year ago there were not more than two or three lines operating out of Atlanta, there are now almost a dozen, covering the entire adjacent territory. These lines are doing an excellent business for the most part in both passenger and freight traffic, and existing companies since the first of the year have found it necessary to add buses to their systems.

In Florida the development of the industry the past year has been remarkable, and there have been at least twenty-five new companies formed in that city. It is now possible to travel throughout all of Florida by motor bus, with the exception of the extreme southern part of the State, and this development has been made possible only by the construction of new roads. The same is true in Georgia.

Successful in North Georgia

In north Georgia the agricultural industry has advanced in less than two years from a comparatively unprofitable business to a highly successful industry, thanks almost entirely, farmers of that section state, to the construction of new roads and the development of the bus industry.

The whole northern part of the State now is interwoven by bus systems, and farmers are making everyday use of these lines in the transportation of their products to nearby markets. At the same time merchants of the section advise that the industry has served to improve their business materially, en-

abling the rural population to make trips at will to nearby buying centers.

The present year will witness the introduction in some of the southern States of proposed legislation that, if passed, will prove inimical to the welfare of the bus industry in the State in question. In Georgia, for instance, an effort was made last year by the short line railroads to have the bus declared a public utility, subject to the same rules and regulations as the railroads, but the Motor Bus and Transportation Association of Georgia was at once organized and succeeded in defeating this law.

The association still is active and is planning a further campaign this year, as it is practically certain the short line railroads will make a second effort to have this legislation passed.

There have been more new bus companies and new lines established in Georgia, Florida, North and South Carolina, Tennessee and Alabama since the first of this year than ever before in the history of the bus industry in this section over a similar period. It is estimated that buses now are covering a mileage of almost 100 per cent greater than a year ago in the Southeast.

New York Plant Bought by David Dunbar Buick

NEW YORK, April 24—The David Dunbar Buick Corp., with headquarters at 25 West Forty-third Street, New York City, has bought a plant at Walden, N. Y., seventy miles from the metropolis, and expects to begin operations about the middle of May. According to the present plans, four models will be produced, with the open jobs listing around \$1,100 and the closed models at about \$1,400, the car to be known as the "Dunbar." One chassis has been turned out to date, and work is progressing on the other three, Buick states.

The new plant, which was purchased from the Dairymen's League, has an appraised value of \$105,000 and has 70,000 sq. ft. of floor space.

Officers of Corporation

Officers of the corporation are as follows:

President and general manager, David Dunbar Buick; vice-president and treasurer, J. L. Dornbos; secretary, Harry C. Hoeft. The directors, in addition to the three officers are: John Fraser, consulting engineer New York City, formerly chief engineer of the Jones & Laughlin Steel Co., Pittsburgh; Henry T. Sheldon, Sherwin-Williams Co.; Ward E. Pearson, vice-president, Union Bankers Corp. and president, Pearson Engineering Corp.; Frank W. Gilbert, president, Pittsburgh Grinding Wheel Co. and president, Oriental Emery Co., Rochester, Pa.

The advisory board consists of the following members:

L. F. MacGowen, Walden, N. Y.; Chester R. Didsbury, Walden, N. Y.; George E. Montrose, Central Valley, N. Y.; George S. Weller, Newburgh, N. Y.; Holmes Vandewater, Poughkeepsie, N. Y.; William Dick, Brooklyn; J. J. O'Connor, Brooklyn and William H. Treat, Derby, Conn.

The capitalization is \$5,000,000 8 per cent cumulative preferred stock of \$25 par value and 600,000 shares of no par value common. The corporation is offering the unsold portion of 100,000 shares of common at \$10 per share.

California Bus Line Adopts Pullman Idea

Installs Upholstered Chairs for Los Angeles-San Francisco Night Ride

LOS ANGELES, April 24—Predictions that the time is not far distant when sleeping berths will be adopted by the operators of motor bus lines are partly borne out by the announcement by Pickwick Stages, Inc., that within three months it will put on a semi-Pullman bus service between San Francisco and Los Angeles.

With this idea in mind six specially designed bodies are being built for Pierce-Arrow chassis at a cost ranging between \$11,000 and \$12,000 each, which will provide for fourteen heavily upholstered chairs, to be built somewhat on the order of steamer chairs, on each bus.

The semi-Pullman buses will be provided with every possible convenience. All chairs will be stationary and ample room will be provided between each chair.

At the outset of the service, the new type of buses will be operated exclusively in the night service between Los Angeles and San Francisco, a distance of 455 miles. Buses will leave either city at 6 o'clock each night, arriving at their destination at 10 o'clock the next morning.

An excess charge of \$3 will be made for passage above the regular rates of \$12.85 one way and \$20.50 for the round trip. At present forty buses are operated by the Pickwick company between the two cities and five complete services are maintained.

If this semi-Pullman service proves a success, it is the intention to install the same type of buses between San Francisco and Portland, a distance of 720 miles. Over this route the Pickwick company now operates twelve buses, taking three days for the trip, driving being confined to daylight hours. The rates for the San Francisco-Portland service are \$18.50 one way and \$35 for the round trip.

High Production Records Claimed for New Grinder

MILWAUKEE, April 23—An advanced type of internal grinder, practically automatic in operation, beltless save for a small speed-changing ribbon, and driven by three electric motors, has been perfected and placed in production after three years of experimental work by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. It is known as the "Teromatic."

Nash Motors has purchased Teromatics for both the Kenosha and Milwaukee plants and the Timken interests have placed orders.

High production records are claimed for the machine.

Mack Advances Plan for Northway Motors

Would Provide Capital and, in
Turn, Receive Stock and
Share of Profits

NATICK, MASS., April 24—About 1000 stockholders attended the meeting of the Northway Motors Corp., here today, and appointed a committee of five to confer with the company's trustees on two proposals submitted to them at the meeting.

John Mack of Allentown, Pa., recently placed in charge of the company as successor to Ralph E. Northway, has offered to take over the company's debt of \$150,000 and to apply \$750,000 to taking up outstanding stock and carrying on the manufacture of motor trucks. The offer to stockholders was \$7.50 for common stock of a par value of \$10 and \$15 for preferred.

In turn, Mack would receive 100,000 shares of common stock, and 80 per cent of the profits.

By the other offer, advanced by Northway, Woodbury & Co. would advance the company \$40,000 and receive a mortgage in return. Northway states that with the new capital the company could carry on the business without change in ownership.

The committee is composed of Fred W. Young of Lynn, W. H. Bassett of New Bedford and James S. Cavanaugh of Everett, who was president at one time; Francis B. Burns and John J. Ahern of Natick. The trustees include Judge Henry C. Mulligan, Stephen L. Holmes, Frank V. Noyes and Reginald Heath.

March Output Aggregated 352,017 Cars and Trucks

WASHINGTON, April 24—Reports received by the Department of Commerce, through the Bureau of Census, show that during March 352,017 cars and trucks were produced, which was 64,006 above the previous high production record in June, 1922. Output of passenger cars increased from 254,650 in February to 318,424 in March and truck production advanced from 21,815 in February to 34,593.

The following table gives the total production for each of the last nine months, with the corresponding figures for the same months of the previous year. With few exceptions, the reports each month are from identical firms and include approximately 90 passenger-car and 80 truck manufacturers.

PASSENGER CARS		
	1922	1921
July	224,770	165,574
August	*248,122	167,705
September	*187,661	144,669
October	216,099	134,734
November	*215,284	106,042
December	*207,269	70,690

	1923	1922
January	223,706	81,693
February	*254,650	109,171
March	318,424	152,959

TRUCKS		
	1922	1921
July	*21,837	10,766
August	*24,467	13,080
September	*19,188	13,648
October	21,512	12,813
November	21,603	10,010
December	20,050	8,307
	1923	1922
January	*19,377	9,416
February	*21,815	13,195
March	34,593	19,761

*Revised.

Automotive Plants Evidence No Let-Up

(Continued from page 940)

the farmer have brightened his outlook and made him an active and important factor in the distribution of automotive products.

This refers to trucks and tractors as well as to cars, and as the sale of these products increases, allied branches in the industry are benefited. Parts makers are operating at a high mark, with no curtailment in orders sighted that would point to a let-up in the production of cars and trucks for several months at least. Tire builders are showing steady improvement in manufacturing schedules and, in instances, are establishing new daily records.

Exports continue to gain except in portions of Europe where conditions are still unsettled and necessarily place limits on purchases. The northern countries are good buyers and there is a further upward trend in purchasing in South American countries.

Tire and Rim Association Names Thacher as Head

CLEVELAND, April 25—At the annual meeting of the Tire & Rim Association of America, S. P. Thacher was chosen president; W. B. Minch, vice-president; George L. Lavery, secretary, and H. W. Kranz, treasurer. In addition, J. E. Hale, E. O. Fritch, J. H. Wagonhurst, W. J. Kirkpatrick, J. D. Anderson, B. Darrow, Fred Lawrence, C. C. Carlton, O. J. Rohde, W. H. Allen, C. B. Offensend and P. Pleiss were named as directors.

The association maintains a corps of more than ninety inspectors in the plants of rim manufacturers in all parts of the country. They inspect all rims manufactured in order to insure production of uniform standard rims, so that they will fit accurately the different sizes of tires made by all the companies. During 1922 there were 16,281,583 rims passed by these inspectors. The first quarter of this year 5,647,250 rims were inspected.

Makers Show Caution in Plant Extensions

Scarcity of Labor Figures in Con-
servatism Evident in Mil-
waukee Section

MILWAUKEE, April 23—It is particularly noticeable in the units and parts division of the automotive industries that the demand from manufacturers of motor trucks is assuming broad proportions, and in some instances makers are falling behind on deliveries because they are unable to increase output as rapidly as the increased demand calls for. So far as passenger cars are concerned, even the installation of 24-hour production schedules has not brought relief from the tremendous pressure.

The tightness in the labor situation is forcibly impressed now that outdoor employment is luring common labor out of shops. One large construction firm engaged in a huge municipal project here is bidding for men at 50 cents an hour on an eight-hour a day basis.

Other Cities Seek Labor

Skilled and semi-skilled men on production jobs are so scarce that those who want to install night shifts cannot man these sufficiently. Within the past week to ten days, classified advertising columns of local newspapers contain more and more requests for all classes of labor from outside industries, even distant industrial centers like Cleveland, Detroit, Pittsburgh and Toledo.

The lack of a labor supply as well as due caution against the possibilities of over-expansion are factors in making industries, automotive and otherwise, proceed slowly with plant extensions that present and immediate future demand for their products certainly justify. Even if, as has now been proposed, the immigration bars be let down, efforts will be moderate, for this relief would not be felt in the high-skilled trades.

In recognition of the fact that the major relief must come from the invention of machinery that will save labor to an even greater extent than the modern designs now in production, machine tool manufacturers here are bending every effort to improve their designs to make them more nearly automatic and less dependent upon the most skilled type of labor for operation.

Bank Reviews Situation

"Automotive parts and equipment concerns are receiving all of the business they can take care of," is the brief comment made in the current edition of the monthly business summary published by the largest Milwaukee bank. It says also: "The past month saw a substantial increase in motor truck sales. . . . A large firm manufacturing engines experienced an increase in sales of 35 per cent and in unfilled orders of 100 per cent over the same period last year."

Discoveries Improve Rubber Manufacture

New Processes, Developed by United States Company, Told to Stockholders

NEW YORK, April 23—C. B. Seger, chairman of the board of directors of the United States Rubber Co., in a letter to stockholders tells them of "three new and basic forward steps in rubber manufacture" which have been patented by the company and which are its property.

These three discoveries are sprayed rubber, web cord and a new method of building and vulcanizing cord tires. Chairman Seger believes these developments mean more to the rubber manufacturer and the user of rubber products of all kinds than anything that has been accomplished in the rubber industry since vulcanization was discovered in 1839.

Sprayed rubber is a new method of producing crude rubber from the original latex, spraying the latex into a snow-white mist which drives the water out of the latex when it comes into contact with pure super-heated air. As it comes from the spraying chamber, this sprayed rubber is a mass of clinging snow-white flakes and 100 per cent pure solids from the virgin latex, it is declared. Greater strength is claimed for it than by the old method, as it contains all the natural strength of the rubber from the original latex, unimpaired by chemicals or the effects of machine working.

Web cord is a rubber-webbed sheet of cotton cords with the filaments of each cord impregnated and surrounded by pure natural rubber, doing away with all cross tie-threads and all resistants to flexure within the fabric. In web cord each individual cord is first soaked in the natural rubber latex, which permeates the cords through and through, no chemical solutions of rubber being used.

Seger Explains Process

Explaining the process, Seger says:

Under the new process in building a cord tire the tire is built in the form of a flat band upon a drum, instead of around a metal core the shape of a tire. The plies of cord are laid and fitted by hand, one above the other, on this drum. The angle and length of every cord in each ply are predetermined, so that each cord is working when in use under conditions of equal stretch and tension.

This flat band then is gently formed to tire shape by an easy air pressure, so that every thread moves freely to its normal position in the finished tire. After this forming process the tire is vulcanized with the elastic pressure of a gas in direct contact with its inner surface, thus insuring uniformity of compaction in the tire walls. There is no variation in the twist of the individual cord, the result being a uniform tire.

DISCUSS BLENDING OF FUELS

BALTIMORE, April 24—The question of blending automobile fuels was dis-

WHITFORD TO DIRECT CRUDE RUBBER SURVEY

WASHINGTON, April 24—The Department of Commerce has appointed Harry N. Whitford, professor of tropical forestry at Yale University, as executive in charge of the investigation of the sources of crude rubber and the possibilities of developing rubber plantations in the Philippine Islands and Latin America.

Professor Whitford has devoted himself to the study and investigation of tropical forestry since 1904, his experience including six years as chief of the division of investigation for the Bureau of Forestry of the Philippine Government, three years in making studies in various producing countries of South America, Central America and Mexico, and six years at Yale University.

cussed at length by members of the Baltimore branch of the American Society of Mechanical Engineers at their meeting here. The discussion was held for the purpose of ascertaining means of attaining the highest efficiency in gasoline blends. Representatives of the American Oil Co., Standard Oil Co., Sherwood Bros. and the United States Industrial Alcohol Co. were present to express their opinions.

Austin Joins British Move and Lowers Lists

LONDON, April 12 (*by mail*)—One of the very few British makers of importance who did not reduce prices in the fall of last year, the Austin Motor Co., Birmingham, has announced substantial reductions in the prices of all models of the 20 hp. type.

The chassis price has fallen £100 to £500, the five-passenger and two-door coupé the same amount and all other models £125. The five-passenger becomes £595.

Austin recently announced that it has made arrangements whereby the then current British prices would in many cases apply at various ports in India, Australia, South Africa and New Zealand, and that at other places overseas the prices would be but slightly more; but the reductions now announced, it is understood, will not be passed on to overseas buyers.

COMMERCIAL CAR PLANT SOLD

DETROIT, April 20—American Commercial Car Co. plant and property was sold at auction this week by the Security Trust Co., receiver, to L. Goldman and E. C. Gray. No bids were made on the property free and clear of encumbrances, which approximate \$277,000. Purchase was made on a basis subject to encumbrances.

Rubber Buyer Calls Stevenson Act Fair

Does Not Inflate Rubber Prices, Declares E. A. Barbour of Singapore

NEW YORK, April 24—Passing through New York on his way home from England, E. A. Barbour of E. A. Barbour, Ltd., Singapore, a prominent rubber buying concern, declares that the Stevenson plan does not inflate rubber prices.

In defense of the rubber growers, he points out that the cost of producing rubber *c.i.f.* New York is approximately 18 cents United States currency, so that it requires a net return of 31 cents a pound to pay the investor 10 per cent on his investment.

"The population of the rubber producing countries affected by restrictions are so entirely in sympathy with the Stevenson measure," says Barbour, "that the smuggling of rubber out of the restricted area could not possibly take place due to the fact that anybody discovering that smuggling was taking place would immediately give the information to the authorities."

Aim Is Not to Raise Prices

He states further:

The producers in the East realize that control of production is necessary both in the instance of the producer and the consumer. It is not the aim of the estates to create high prices, believing as they do that 6d. per pound is a fair return on their investments.

If the price of crude rubber moves up, the central committee in charge of the restriction program will immediately increase by a big percentage the amount of crude rubber to be exported. The committee undoubtedly has this power under the colonial legislation as enacted.

This fact is in direct contradiction to statements made here that the Stevenson act deliberately aims to create a shortage and force up prices. There is no possibility of a shortage of rubber being created by the restriction program.

The estates could undoubtedly produce at short notice somewhat in the neighborhood of 140 per cent of the standard production as now fixed, and should it become necessary by a sharp increase in prices, or a possibility of any shortage in supplies at this side, the increase to 140 per cent would be immediately authorized by the central committee.

Copper Cooled Phaeton Is Now Listed at \$595

DETROIT, April 24—The Chevrolet Motor Co. has issued an April list on all models which establishes the prices on the copper cooled models on a somewhat lower basis than was expected when these models were first announced.

The established prices are as follows: Roadster, \$580; phaeton, \$595; utility coupé, \$750; sedanette, \$920, and sedan, \$930.

Battery Employees to Be Shareholders

Exide Makers Also Perfect Pension Plan—Company Looks for Biggest Year

PHILADELPHIA, April 24—The Electric Storage Battery Co. will have the biggest year in its history during 1923, according to President Herbert Lloyd. Speaking after adjournment of the annual meeting of the stockholders in Camden, N. J., Mr. Lloyd said that the demand for automobile, radio and telephone accessories continues unabated and that a shortage of skilled labor would be the only factor that might serve to restrict production.

"Orders are coming in in considerable volume," Lloyd said, "and the Crescentville plant is operating at two-thirds capacity. The remainder will be equipped and ready in the near future. That part of the new plant that has been in service for the last six months has demonstrated its efficiency. We are now employing 4000 more men and women than ever before were on the payroll."

Shareholders of the company have approved a proposal to sell stock to employees on the installment plan and also a pension plan for employees. The stock subscription plans call for payments of \$1 per share per month, the maximum subscription to be twenty shares at \$53 a share. The pension plan provides for employees after thirty years' service and for disabled employees after fifteen years' service. A fund of \$350,000 has been set aside for the pensions. It will ultimately be increased to \$500,000.

Retiring directors were reelected and the shareholders, by a vote of 540,536 shares, adopted a resolution praising the efficiency of the management and employees. Lloyd expressed himself in an optimistic manner on the outlook for the company with its employees becoming shareholders.

Goodyear Ended Quarter With \$6,110,600 Earned

AKRON, April 27—E. G. Wilmer, chairman of the Goodyear Tire & Rubber Co., has issued the following statement:

For the three months ending March 31 Goodyear earnings, after depreciation and taxes and before interest and fixed charges, were \$6,110,600. Net earnings after all charges were \$4,776,200. The balance sheet as of March 31 shows current assets of \$60,075,700 and current liabilities of \$8,022,400. Cash and United States Treasury certificates aggregated \$8,461,500. Surplus was \$10,855,100.

On account of favorable raw material purchases, as well as an excellent volume of business, results for the first quarter were unusually favorable.

The earnings before interest and fixed charges for the quarter, as reported at \$6,110,600, compared with \$10,101,430 for the entire calendar year 1922.

Net earnings after all charges for the quarter amounted to \$4,776,200, equivalent to \$23.88 a share on the \$20,000,000 of prior preference stock outstanding, and after allowance for the quarter's dividend on that stock, to \$6.72 a share for the quarter on the \$65,079,600 of outstanding 7 per cent preferred stock.

The ratio of current assets to current liabilities, as shown by the balance sheet of March 31, stands at 7.48 to 1.

FINANCIAL NOTES

Fifth Avenue Bus Co. of New York shows earnings for 1922 at the rate of \$1.62 per share on the stock, compared with \$1.58 in 1921 and 94 cents in 1920 and 1919. Current earnings were slightly better than those of 1922. It also places fixed capital account of \$3,559,383, less depreciation of \$1,094,180. The corporate stock has an asset value of \$7.63 a share, of which \$4.14 is invested in investment bonds. The franchise with the city is carried on the books at \$29,829.

Stewart-Warner Speedometer Corp. has declared an extra dividend and increased the regular quarterly dividend on the capital stock. The extra dividend amounts to 50 cents a share and the regular quarterly dividend under the new rate will be \$2 instead of \$1.50. Both dividends are payable May 15 to stockholders of record April 30. The company earned \$2,072,400 in the first quarter this year as against \$516,400 in the same period last year.

McCord Radiator Manufacturing Co.'s first month of operation as a segregated portion of the McCord Manufacturing Co. shows a net after depreciation but before taxes of \$128,000 for March, an increase of 35 per cent over the same month a year ago. March's unfilled orders exceeded production. The balance sheet as of March 1 showed current assets of \$1,347,765 as against current liabilities of \$224,316.

Graton & Knight Manufacturing Co., Worcester, Mass., maker of leathers, has changed its authorized capital stock from \$30,000,000 to \$15,000,000 by reducing the par of 600,000 common shares from \$25 par to no par value. There also are 150,000 shares of \$100 par preferred.

Rolls-Royce of America for the first quarter of 1923 reports net profits of \$141,189 after providing for bond interest. This compares with a loss of \$157,914 in the same period in 1922. The company is operating at capacity.

Firestone Tire & Rubber Co. has declared the regular quarterly dividend of 1 1/4 per cent on the 7 per cent preferred stock, payable May 15 to stock of record May 1.

Obenberger Forge Co., Milwaukee, has increased its capital stock from \$200,000 to \$400,000 to accommodate the growth of its business.

Three Mercedes Entered for Indianapolis Race

INDIANAPOLIS, April 23—Announcement of the entry of three Mercedes cars in the 500-mile-race to be run at Indianapolis May 30 is made.

The entry is filed by the Daimler Motoren Gesellschaft, Stuttgart, Germany, this being the first direct factory entry ever made in the local race by the Daimler company.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Business activity, as measured by the volume of payments by check, is increasing and maintaining an appreciably higher level than in corresponding periods last year. Debits to individual accounts, which eliminate the duplication in bank clearing totals, where checks are cleared through two cities, reached a total of \$10,337,000,000 in the week ending April 18 as reported from 244 centers of the Federal Reserve system.

This is an increase of \$1,243,000,000, or 13.7 per cent, as compared with the corresponding week in 1922, and is 8.7 per cent greater than the total for the preceding week. This indication of the total volume of business is useful in determining trends, although there is often a lag between the time of the actual transaction, purchase or sale, and the later payment by check.

Commercial paper interest rates ranged from 5 to 5 1/4 per cent last week, with less well known names quoted at the higher figure, as in the preceding week.

The expansion of bank loans continues at a moderate rate. During the four weeks period ended April 11, the reporting member banks of the Federal Reserve System increased their loans and discounts \$102,140,000, or about half the increase of the preceding four weeks, which amounted to \$214,200,000. Since the end of 1922 the total commercial loans of these banks have increased about a half billion dollars.

The extent to which the reporting member banks are relying on the Federal Reserve Banks is shown by the ratio of bills payable and rediscounts with the Federal Reserve banks to total loans and investments. This ratio decreased from 2.8 to 2.4 per cent in the latest weekly statement. The reserve ratio of 75.5 per cent for the Federal Reserve banks, although slightly less than a week earlier, shows the continued preservation of large lending power.

Freight Rates on Horns to Be Cut After June 16

NEW YORK, April 24—After a long fight the Klaxon Co. has secured a reduction in freight rates on horns. It has been ordered by the Interstate Commerce Commission that on or about June 16, 1923, a reduction of freight rates be in force on automobile, bicycle, motor boat or motorcycle horns in barrels, or boxes in less than carload lots in official and western and southern classifications.

As an example, the old rate from Newark, N. J., to San Francisco on carload lots was \$4.80 per 100 lb.; the new rate will be \$3.98. Less than carload lots from Newark to San Francisco will be reduced from \$8.32 to \$5.55. The old minimum carload was 18,000 lb.; the new minimum will be 24,000 lb.

Big Makers Bought Sheet Steel Early

Policy Is Commended by Producer as One That Assures Adequate Supply

WHITE SULPHUR SPRINGS, VA., April 24—Classification of shipments of sheet steel for the six months ending April 1, 1923, shows that the automotive industry took 34.5 per cent of the total tonnage. These figures were made known in a talk by W. S. Horner, president of the National Association of Sheet and Tinplate Manufacturers, at the first annual convention of the Sheet Steel Executives, held here. These data are based upon the records of 25 companies shipping 1,326,632 tons, or 88.6 per cent of the total shipments of all independent manufacturers.

G. H. Charls, vice-president and general manager of the United Alloy Steel Corp., Canton, Ohio, declared that the automobile industry has found it wise and beneficial to purchase sheets in the season when mills are not rushed. He declared that this policy was adopted by some of the largest automobile companies last winter and predicted that others would soon follow in order that the supply may be assured.

It was his contention that placing orders during the dull season would prevent wild scrambling for sheets, preventing excessive prices which created the buyers' strikes.

It was further stated by Charls that aluminum is displacing automobile body sheets.

Indiana Bus Operators to Meet at Peru, May 7

INDIANAPOLIS, April 21—The proposed organization of a Statewide Indiana bus association was not completed at the meeting held here April 17 and attended by about thirty bus operators and representatives of bus groups of the State. A second meeting has been called for May 7 to be held at Peru, Ind.

Practically all of the operators present at the meeting said that the necessity for a State organization was never greater than now, and that the association when well started can be of vast help to the new companies which are about to start and to those to follow. All operators will be urged to turn out at Peru, which is central to a large bus territory, and to make the coming association as representative of the State as possible.

DEMAND FOR ASH GROWS

ATLANTA, April 24—Atlanta lumber manufacturers advise that the demand for thicker dimensions of white ash, maple and elm from the automobile and body manufacturing trades of the North and East has further increased the past month and that there is a marked short-

age in these items due to inclement weather holding up production in the timber tracts.

Automobile manufacturers are purchasing more ash than they have in the last three years. Prices remain stable with the tendency upward. Very few mills are able to supply ash if immediate delivery is wanted.

INDUSTRIAL NOTES

Orlando Manufacturing Co., Orlando, Fla., of which E. J. Jenkins is president and general manager, has started manufacturing pistons, rings and pins for the replacement trade as well as a line of metal products for the South and the South American and Cuban trade, including sprayers, spray tanks, and small front drive tractors for sugar cane, cotton and grove cultivation.

Moller Motor Co., Lewistown, Pa., manufacturer of automobile bodies, will remove its plant to Hagerstown, Md., where it has purchased ground, fronting 1,000 feet on the Pennsylvania Railroad tracks. The first building will be finished on July 1. The Hastings Body Works of Philadelphia is completing several different types of bodies for the concern.

Royal Palm Rubber Co. has been organized at Kelsey City, Fla., and plans the construction there this spring of a plant for the manufacture of tires. Daily output of the factory at the outset will be about 50 finished tires, according to C. F. Laughlin of Salisbury, N. C., who heads the company as president and manager.

Cutler-Hammer Mfg. Co. of Milwaukee has made an agency arrangement with O. T. Jenkins, Dallas, Texas, covering the sale of wiring devices, radio apparatus and standard industrial heating apparatus in Texas and Oklahoma.

Detroit Air Cooled Car Co. has taken possession of its plant at Wayne, Mich. A public mass meeting was held recently to give the citizens an opportunity to become acquainted with the executives of the company.

Tungsten Spark Plug Co. has moved its entire organization from Marshalltown, Mo., to St. Joseph. The new managers will maintain a strictly jobbing policy, selling only through established jobbers.

Advance Automobile Accessories Corp. of Chicago is now operating its new metal parts plant at Homewood, Ill., at capacity. The company's textile mill is located at East Rochester, Ill.

Midwest Engine Corp. is utilizing part of its plant not used for the manufacture of automobile engines for the reconditioning of freight cars and railway locomotives.

Durant Plants Approach Mark of 1000 Cars Daily

NEW YORK, April 23—Durant plants, working on a production schedule of 19,500 cars for April, turned out 9000 the first half of the month. In May it is planned to manufacture 28,600 and in June 29,950.

Aiming at the coveted goal of 1000 cars per day, the Durant plants reached a highwater mark of 989 on April 12. The corporation now claims 3000 dealers in the United States and Canada.

METAL MARKETS

Much emphasis is being laid on the orderly manner in which the steel industry is rounding the corner or, as some call it, making the turn, by which they mean the descent from the peak of activity. So far, however, there has been no decline in the rate of operations, the backlog of orders which mills have on their books sufficing to ensure continuity of top-notch producing activity for some time to come. Because of this prop there has been so far no indication of any concessions in base prices. With production and base prices intact, the only thing that has tapered off has been fresh buying. Demand for emergency tonnages at premium prices has dwindled, although it has not yet completely disappeared.

As the steel market, unless it is hopelessly neglected by lack of demand, is never at rest for any considerable period of time, thought centers principally in what developments the near future will bring forth. Far more important a factor in this connection than the relation between the demand and supply of steel and the internal conditions of the steel producing and consuming industries is the future course of the money market. In some branches of commerce the warning of financial authorities to shorten commitments instead of lengthening them has apparently fallen on deaf ears, and if the Federal Reserve authorities should decide that this warning must be supplemented by higher discount rates, the steel market would undoubtedly feel the effect sharply.

For the current quarter the steel mills have comfortably filled order books, but operations and prices during the second half of the year, in spite of the lately so frequently heard assertion that the steel industry was assured of continuous operation on the present scale during the entire year, are still far more of a problem than a certainty. A fair carry-over of business into third quarter depends upon fresh buying in May. If conditions continue on an even keel in the money market and the steel industry is permitted to devote all of its energies in the next few weeks to the expediting of the orders now on its books, consuming appetite will gradually reassert itself and after a brief intermission buyers now hesitant will again enter the market, though they may be somewhat more disposed to drive a sharper bargain than they did during the last buying movement.

Many steel producers recognize that, if additional increases are granted to labor, the industry faces a buyers' strike. If they are not granted, it may face a labor strike. Certain it is that the present with a fair quota of orders on their books is far more pleasant to contemplate by steel producers than the outlook with its uncertainties. Amid these conditions there are naturally steel consumers who believe that before long buyers will again have something to say about prices.

Pig Iron.—The market is quiet. If there were any representative transactions, it would probably be found that prices are more plastic than they have been. Third quarter buying is still in abeyance.

Aluminum.—Arrivals of foreign aluminum are somewhat larger, but most of the metal coming in has been sold in advance. The market in general remains unchanged.

Copper.—Consumers appear to be well supplied for the next 60 days and there is no immediate prospect of another buying flurry.

Calendar

SHOWS

- Sept. 1-7—Chicago, National Transportation Exhibition, under the auspices of Motor Truck Industries, Coliseum and Annex.
- Nov. 4-10—New York, First Automobile Exposition of the Foreign Automotive Association, Hotel Astor.

FOREIGN SHOWS

- May 9-June 12—Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.
- Oct. 4-14—Paris, Passenger Cars, Bicycles, Motorcycles and Accessories, Grand Palais.
- Oct. 24-Nov. 2—Paris, Trucks, Agricultural Tractors, etc., Grand Palais.
- Nov. 1-15—Buenos Aires, Annual Automobile Exposition, under the direction

of the Automovil Club Argentino.

RACES

- May 10—Berlin - Grunewald, German Grand Prix.
- May 30—Indianapolis, Eleventh Annual 500-mile International Sweepstakes.
- July 2—Tours, French Grand Prix 500-mile race.
- Oct. 28—Barcelona, Spain, Grand Prix for vehicles of 1500 c.c.; Nov. 1, International Grand Prix for cycle cars of 1100—Nov. 4, International Grand Prix for two liter.

CONVENTIONS

- May 2, 3, 4—New Orleans, Annual Convention of the National Foreign Trade Council.
- May 7-10—New York, Annual Convention of the United States Chamber of Commerce.

May 10—New York, Annual Meeting of the National Highway Traffic Association, Automobile Club of America.

May 7-12—Seville, Spain, Fourth International Highway Congress.

May 15-16—Detroit, Spring Convention of the Service Managers' Division of the National Automobile Chamber of Commerce, General Motors Building.

Oct. 24-26—Cleveland, Thirtieth Annual Convention of the National Association of Farm Equipment Manufacturers, Hotel Statler.

Nov. 12-17—Chicago, Annual Business Exhibit and Convention of the Automotive Equipment Association, Coliseum.

S. A. E. MEETINGS

Metropolitan Section
May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther

Engineering Co., Subject, Metallic Materials for Automotive Work.

Other S. A. E. Meetings

- June 19-23—Summer Meeting of the S. A. E.—Spring Lake, N. J.
- Oct. 25-26—Production Meeting of the S. A. E.—Cleveland.
- Jan. 1924—Annual Meeting of the S. A. E.—Detroit.

MEETINGS

- June 14-15—Bethlehem, Pa., Eastern Sectional Meeting of the American Society for Steel Treating, Hotel Reservations made through George C. Lilly, Superintendent of Heat Treatment, Bethlehem Steel Co., Bethlehem.
- June 25-July 1—Dixville Notch, N. H., Summer Meeting of the Automotive Equipment Association.

Use and Production of Gasoline Declined

WASHINGTON, April 23—The Bureau of Mines survey of 287 refineries shows a production of 568,652,078 gallons of gasoline during February, as compared with 623,823,337 gallons in January and 398,223,146 gallons in February, 1922.

The indicated consumption of gasoline in February was 373,564,478 gallons as against a consumption of 443,128,456 gallons in January and 262,925,732 gallons in February of last year. Refineries operated during February at 79.4 per cent of their aggregate daily indicated crude oil capacity of 1,918,595 barrels.

The Bureau of Mines' figures show an increase of 1 per cent in the rate of refinery operations in the country, compared with January. The daily rate of indicated domestic consumption of gasoline in February decreased 6.7 per cent from the January rate.

Gasoline stocks on March 1 had attained a new high mark of 1,130,340,767 gallons, according to the Department of the Interior. The figures show a gain of 127,000,000 gallons over reserves on hand Feb. 1, when stocks for the first time in history crossed the billion gallon mark.

Willys Creditors to Get Dividend of 21 Per Cent

TOLEDO, April 25—Payment of a dividend of 21 per cent to approved creditors of the Willys Corp. was ordered by Federal Judge Killits here today upon application of the receivers.

It was reported that they had on hand for the payment \$3,491,121 received from the four Federal jurisdictions in which the corporation had property. A reserve of \$340,983.90 was ordered held back for payment of tax claims and settlement

of a claim of the United States Light and Heat Corp.

Claims so far approved total \$15,000,657, and receivers already have paid 57 per cent, or \$8,550,375.

Willys Ruling Modified

TOLEDO, April 23—Judge John M. Killits in Federal court here has modified the restraining order granted at the time receivers were appointed for the Willys Corp. so as to enable them to transfer patent rights purchased by Clement O. Miniger. The rights go along with the Auto-Lite properties purchased by Miniger for \$4,750,000.

Wills Receiver Asks for Sale of Property

DETROIT, April 26—A petition has been filed in the Federal Court by the Security Trust Co., receiver for C. H. Wills & Co., asking for the sale of the plant and assets the latter part of May or early in June. The receiver stated that, in his opinion, operations might be conducted without loss and that up to June 20 a program of not exceeding 300 cars a month might be closely adhered to. The receiver desires that the sale be made as a going concern.

FRANKLIN SALES TRIPLED

SYRACUSE, N. Y., April 24—Franklin dealers sold practically three times as many new Franklin cars during the first quarter of this year as they sold during the same quarter in 1922. It is also stated that 71 per cent of shipments in the first quarter were closed cars.

ACHILLES RUBBER INSOLVENT

UTICA, N. Y., April 23—An involuntary petition in bankruptcy has been filed against the Achilles Rubber & Tire Co. of Binghamton, liabilities being placed at \$330,600 and assets of \$260,000. The concern admits its insolvency.

Detroit Last Month Sold 6895 New Cars

DETROIT, April 25—Retail sales of passenger cars in Detroit during March totaled 6895, more than doubling sales for February which aggregated 3060. There was an almost even division as between open and closed models, the former being slightly in the lead by figures of 3627 to 3268. Truck sales for the month were 641, which compared with 387 in February.

In the doubling over of business practically every manufacturer shared. Ford's part of the total was 2839, as compared with 1507 in February, and peculiarly for the season, Ford's closed business exceeded open by seven cars. Chevrolet jumped from 386 to 1146; 696 open and 350 closed. Star went from 58 to 179, and Overland from 39 to 117.

In the middle priced field Buick jumped from 131 to 423, Studebaker from 153 to 387, Hupp from 164 to 316 and Dodge Brothers, 62 to 185. Hudson-Essex continued to lead in proportion of closed to open models, Hudson showing 106 closed to 39 open, and Essex 118 closed to 21 open. Hudson and Essex each sold 51 cars in February. Willys-Knight went from 60 to 128 and Jewett from 62 to 138.

In the higher priced field Cadillac business increased from 24 to 57; Packard from 17 to 47, and Lincoln, 3 to 14. Locomobile and Rolls-Royce broke into the sales columns for the first time this year, the former having 2 and the latter 1. Reo and Rickenbacker showed increases from 7 to 46 and 10 to 42 respectively. Oakland and Olds jumped from 37 and 21 respectively to 70 and 62 during the month.

Of the truck total of 641 Ford had 430, and Dodge Brothers and Reo, 38 and 22 respectively. In the heavy duty field Federal reported 25; G.M.C., 21, and Packard, 16.